MODERN REJUVENATION METHODS

By
CHARLES EVANS MORRIS, M.D.

DEDICATED TO

Wm. J. A. Bailey, director of the Bailey Radium Laboratories, East Orange, New Jersey, whose brilliant achievements in correlating endocrinology and radioactivity have made possible the results I have described in this book.

Charles Evans Morris, M.D.

BAILEY

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CHARLES EVANS MORRIS, M.D.

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PUBLISHER'S PREFACE

CAN modern science make men and women young again? Can the abundant life, health and spirit of youth be renewed? Foremost scientists claim that this is possible and point with pride to the fact that already withered, ailing, wrinkled, forgetful "has-beens" have been turned into alert, healthy, vigorous persons fired with the energy of romantic youth. Younger people, also, who have never enjoyed full normal development, or who have burned up their energies too rapidly, have been given a renewal of their full "birthright" by men of science.

Dr. Morris, the author of this epoch-making book, shows how these astonishing results can now be obtained by anyone. He has written this book in a popular manner to give to the world the results of his own careful personal experience. He shows that rejuvenation is no longer a precious possession to be obtained by the rich alone, but has been made available to all. Yet the methods he has used are simple in the extreme and he shows how his own surprising accomplishments and brilliant success with the hundred and one ailments that sorely beset mankind can now be duplicated by anyone.

There is nothing technical or involved. These modern miracles, which have attracted world-wide attention in the greatest scientific circles, are obtained entirely without operations of any kind and without the use of drugs. Dr. Morris puts forth no new theories, no fads, no experiments. He has simply used agencies that have been thoroughly demonstrated for several years in the leading clinics throughout the world. The same methods are available to any other physician or individual.

Millions of people are yearning for the truth about rejuvenation, which does not mean simply the renewal of sexual energies, but an abundance of life, health, energy and freedom from organic, neurotic and psychic difficulties from which half the human race is seriously afflicted. The author takes the reader step by step showing clearly how rejuvenation is accomplished and how the body is restored to bountiful health.

In the past few years physiology may be said to have been revolutionized by our new knowledge of the endocrine glands and their control over looks, personality, age, thought, love, sex, happiness, sickness and human energy. The way they control all mental and physical functions and how they can be stimulated to bring about rejuvenescence is well told herein by Dr. Morris.

Dr. Morris gives due credit to Dr. Wm. J. A. Bailey, director of the Bailey Radium Laboratories of East Orange, N. J., the eminent scientist, whose researches in the field of radioactivity and endocrinology have earned the tributes of the medical profession.

Anyone who reads will understand the basic principles involved in this great treatment. You are entitled to the word of the scientist. You have a right to know what the most recent discoveries can do for you. Read this great book with care, for it will have a far-reaching effect upon the lives of those who would otherwise be denied the blessings of youthful activities and mental energies throughout greatly extended careers and bring to them a tremendous enhancement of mental and physical powers. If you lack health or buoyant vitality or if you are approaching the chasm of the infinite this book will surely point the way to a new life of happiness and usefulness.

We particularly call the reader's attention to chapter XXII of this book, in which Dr. Morris admirably sums up the results of his work in many different bodily disturbances.

Leading doctors in all parts of the world are to-day giving the rejuvenating treatment depicted herein by the

author. The entire medical world is rapidly awakening to the tremendous possibilities offered for the cure or alleviation of most hopeless conditions through this modern scientific method.

The Publishers

THESE ARE THE AILMENTS

which the author states can be successfully treated by modern scientific rejuvenation methods as explained in the text.

If you have any of the conditions named on the opposite page read this great book carefully and learn for yourself what modern science can now do to ameliorate them without drugs, operations, diet or fads.

A new glorious life of freedom from physical, mental and nervous troubles to-day awaits the man or woman who learns and applies the simple methods explained in this book.

Here at last is the open door!

A detailed explanation of each of these ailments will be found in Chapter XXII.

Those who wish to diagnose their own condition with reference to their glands are referred to Chapter II, the most complete gland diagnosis data ever published.

Note particularly that throughout this book the author quotes the greatest authorities of both this country and Europe.

Acidosis
Adynamia
Albuminuria
Amenorrhea
Anemia
Angina Pectoris
Arteriosclerosis
Arthritis
Asthenia
Asthma
Auto-intoxication
Backward Development
Bacterial Infections
High Blood Pressure
Low Blood Pressure
Bright's Disease
Bronchitis
Catarrhal Conditions
Chlorosis
Colds
Colitis
Constipation
Deafness
Debility
Diabetes
Dysmenorrhea
Dyspepsia
Dyspnea
Enuresis
Exhaustion
Eye Troubles
Flatulence
Genital Disorders
Goitre
Gout
Hay Fever
Headache
Heart Trouble
Hodgkin's Disease
Hysteria
Impotency
Insomnia
Indigestion
Kidney Trouble
Locomotor Ataxia
Lumbago
Malaria
Malnutrition
Melancholia
Mental Aberration
Menopause Troubles
Menorrhagia
Menstrual Disorders
Metrorrhagia
Migraine
Myalgia
Myasthenia
Nausea
Nephritis
Nervous Conditions
Neuralgia
Neuritis
Obesity
Paralysis Agitans
Polyuria
Prostatitis
Rheumatism
Sciatica
Senility
Sexual Decline
Sinusitus
Skin Ailments
Stomach Disorders
Ulcers
Vertigo
Wrinkles
All conditions of faulty glands, chemistry and metabolism.

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INTRODUCTION

Some years ago I was attracted by the work a young physicist was doing in the field of radioactivity and endocrinology. To a large extent his work then seemed to be visionary, yet somehow or other he impressed me with the sincerity of his purpose. I knew that he was an expert in radioactivity and, realizing the intensive research necessary to become skilled in this field, I reasoned that he knew whereof he spoke and I undertook the task of applying his technique in my medical practice.

To-day this man is known throughout the civilized world. The name of Bailey is now a household word in every corner of the globe. In the brief space of the past five years he has done more to make rejuvenation possible than any other man in all history. His visions of years ago now find definite expression in medical practice to-day. Writing in the *Forum* (Nov. 1924) Dr. H. H. Rubin stated "To Dr. Wm. J. A. Bailey, an American physicist in the highly technical field of radioactivity, the world owes a real debt for his researches in promoting cellular metabolism by means of endocrine gland activation. His work has come the nearest yet to making rejuvenation a reality and all evidence to date points to a sensible solution of this baffling problem".

I was fortunate indeed to have received at an early date the benefits of Bailey's research and development. I had an opportunity to compare his theories with those of Voronoff, Steinach and others who have done much in the field of rejuvenation. I tried out his technique with certain misgivings at first, but as the living evidences of rejuvenescence appeared in my practice, under the simple procedure developed by him, the real truth and

importance of his gift to mankind came upon me with overwhelming force. And yet there is no mystery in his method, no operations, no complicated technique—just the simple natural physical agencies that the Almighty has placed in man's hands to use freely and which have been demonstrated in tens of thousands of cases in the leading clinics and hospitals throughout the world.

And now as I look back I can realize that the visions of Bailey were not mere dreams, but were based on scrupulously accurate scientific knowledge of the most deep-seated kind. And too I can well appreciate that he was guided by a certain inspired faith that has marked the work of others who have given much to mankind. We have seen such faith, such prevision, unfolded before the eyes of Columbus which piloted him across the unknown ocean. It was faith of this kind that illumined the soul of men like Loyola with the ideal of world won over to Christ, an ideal which led the heroic missionary crusade. Watts, Stevenson, Fulton were inspired with the same prescient vision when they foresaw the giant grasp of steam opening up the arteries of the world to travel and commerce. Such faith came to Franklin when he captured the thunderbolt. It came to the great Edison, Ampere, Volta, Faraday, who trained these thunderbolts for human service. The same faith guided the great Lister when he reached down into the depths of the minute, hitherto unseen, microbic life. Men can only marvel at the faith and prophetic years of the great men who have welded the nations together through wires and wireless—the Morses, Fields, Bells, Marconis, De Forrests, Langmuirs. They have visualized men speaking across continents and oceans and this realization has come true. It is this great ideal from afar, this great faith, which constantly holds up the torch of progress and leads the way to mankind.

The most violent medical controversy since Semmelweis discovered the principles of antisepsis is now raging around the subject of rejuvenation. The concept that a man or woman can be made young again is em-

phatically denied by many brilliant thinkers and just as emphatically affirmed by men equally great.

There has been a great deal of twaddle on the subject from both sides. As was to be expected, the charlatan has been exploiting his wares aggressively. Leading lights of the medical profession declare that "senescence is as much a physiological phenomenon as growth"—to quote from one writer. Others even go so far as to say that rejuvenation is an utter impossibility—will never be accomplished. When we hear talk like this we lose our respect for such writers. The word "impossibility" is not greatly relished among scientific workers. Too many "impossible" things have been accomplished since the Wright Brothers were told that flying was an impossibility.

Even great geniuses themselves have demonstrated that a thing could not be accomplished and yet this has afterward been perfected with the greatest of ease. I recall how Sir Isaac Newton laboriously demonstrated only two centuries ago that no steamship could cross the Atlantic Ocean, because the weight of the coals required to drive the vessel that distance would sink the ship. Perhaps the most striking example of all is the statement made by Lord Kelvin a few months before the Wright Brothers demonstrated the truth of flying through the air. Lord Kelvin delivered a weighty mathematical paper covering the problems of flight in heavier than air machines and proved that such an accomplishment was totally and forever impossible.

I am somewhat in favor of agreeing with the great Professor Dr. Jacques Loeb, who stated in effect that a true scientist was one who could stand squarely on his feet and say "Nothing is impossible".

The possibilities of science to-day are as great as all eternity. What is impossible to-day is commonplace to-morrow. Yesterday men were called charlatans for proclaiming truths that are being taught to the schoolboy to-day. A few years ago Brown-Séquard was laughed to scorn for his claims of partial rejuvenation

through the ductless glands, yet to-day he is virtually sainted by the medical profession.

There is no truce in science, whether it be the physicist, the chemist, the biologist, botanist, mathematician, zoölogist or others. There is no truce as far as they are concerned in the fight for truth. They neither ask quarter nor show mercy. They are inexorable in their fight to make truth triumphant. The truth will never be free from their tireless pursuit; they know no closed season. There is a fresh beginning for them each morning. The world is made anew for them each day. When the shades of night appear they return from their search in the unknown satisfied if they have found a single scrap of truth. They are ceaseless in their activity. They regard it a disgrace to cease being constantly and eagerly in search to prove one law or even a theory in the hope of arriving at some new portion of the great truth of the Universe. They live in order that they may know more. They believe all things are possible—even rejuvenation.

In my personal experience as a practicing physician with all methods that have been suggested for rejuvenation I claim that it is a reality and I have written this book to state the facts as I have found them. I have tried to present a clear and concise picture of the whole story of rejuvenation effort and can only ask the reader to form his own conclusions. One will find enough interest in this work to whet the most jaded appetite. I do not claim that the last word has been said on the subject, but the saddened homes I have seen brightened, the suffering that I have personally seen relieved, the new hope of happiness that I have seen put into the hearts of many prove beyond the shadow of a doubt that modern science has at last achieved a tremendous measure of success in this great field.

These new scientific developments will unquestionably upset many old-fashioned notions and doctor's hobbies. Many doctors who have been out of medical school for years have not found time to keep abreast of the modern

sciences, particularly the importance of the endocrines or ductless glands in the human economy. However, I am happy to say that there are very few doctors in this country who are so "sot" in their ways that they do not believe in anything new. Their type did not believe in the definite proof given by Pasteur. They resisted the therapeutic usefulness of the X-ray, of radium, of the quartz-light and are even to-day, through sheer ignorance, resisting the use of certain methods of changing the body chemistry by means of endocrine gland treatment. They have resisted everything of an advanced character, even those things as definitely established as the laws of gravitation.

There has been a mistaken notion regarding the word "rejuvenation". The public press has used it to some extent as a butt for their jokes. Many people are under the impression that rejuvenation treatment does nothing but restore the sexual powers. This is not a fact, as the restoration of sexual potency is only incidental to the general restoration and not deserving of special place, although it is obtained rather uniformly in all treatment. Rejuvenation can be as readily applied to a child as to an octogenarian. The work done in the field of rejuvenation has had a far greater concept than the mere renewal of sex functions. It has a higher, nobler, broader plan which transcends all the petty, physical self-gratification desires of the roué. The control of the endocrine glands, which is the basis of modern rejuvenation, has had for its object the restoration to perfect health of men, women and children from the many ills that affect humanity. Its purpose is not alone to make people young, but to make everyone healthier, both physically and mentally. It is basic in its thought and world-wide in its scope. Theoretically rejuvenation means to "make young", but practically it means "to normalize". A man or woman at 60 in perfect health would have certain mental and physical attributes that makes them appear younger in every way than many people of 40. If on the other hand, one at 60 is in the last stages of senile

decay, heavily wrinkled, with a fading memory, halting step, pale, emaciated or unduly obese, they are to all intents and purposes the equivalent in age of one of 80 or 90. Therefore, if by any means this person has the causes of disintegration removed and restored to a condition of perfect health, both mentally and physically, in other words to the normal of 60, we would consider that he or she had been rejuvenated.

Practically every worker in this field has made use of the endocrine or ductless glands, which I shall explain fully later, because through them the solution of the enigma of disease and bodily disorder has been found. I do not have to hold any brief for the great science of endocrinology—the study and control of the endocrine glands. The greatest minds of the world have worked on these glands and through them are revolutionizing our conception of the whole story of man as a chemical entity. The Nobel prize to Dr. Banting for his work with one of these glands is merely an example of the trend of scientific development in the great field of endocrinology.

In a statement issued by the American Chemical Society in April, 1924 we read:

> "It is to be hoped that a more complete knowledge of the endocrine glands will enable us to combat old age, since old age is marked by a series of anatomical changes which might result from failure of the stimulating and sustaining hormones of these glands."

This book should prove of great benefit to society generally in that it extends to all a comparatively simple statement of facts heretofore hidden in the laboratory. It is hoped that it may have a far-reaching effect on those burdened with physical incapacities and mental deficiencies and aberrations heretofore unreached by medical assistance and in many cases doomed to helplessness and despair. It is little realized by the world generally that every human impulse, every organic

action, every fleeting thought, every trait of character, is a direct expression of the proportion of functioning activity of these mysterious endocrine glands. Human character is now definitely known to lie within these glands. When I tell you that these glands are now being brought under the control of man you will begin to obtain some idea of the tremendous scope of this new field.

Life has been regarded as a process of construction and decay. From the healthy soil of maturity comes the beautiful blossom of childhood, the vigor of youth, the glory of adolescence, the power of maturity—then decline, sterility, senility, and death. Such has at least been the academic viewpoint throughout all history. And yet to-day we have men questioning seriously whether such a plan of life is decided by Fate or whether the span is due to our present stage of evolution under the plan of the Almighty, if you will, or whether a single, simple development of means of controlling the body chemistry may not instantly spread the period of maturity and the full vigor and bloom of manhood and womanhood for a thousand years or more. Such a great scientist as Dr. Fritz Haber before the Franklin Institute of Philadelphia on Sept. 21, 1924 predicted that "science would bring forth discoveries that would produce a race of supermen who may be expected to live as long as a thousand years through elimination of the causes of natural death."

Dr. Serge Voronoff declares that very soon men will be able to live as long as they wish, for the body cells can live forever and if properly treated will live forever. Dr. Thomas Darlington, formerly Health Commissioner of New York City, stated in a recent article that people right now should easily live to be 120 years, while Sir Ronald Ross, one of England's foremost authorities on scientific and medical research, states that 150 years of youth is now possible for all with our new discoveries of the functions and control of the endocrine glands. The great Rumanian savants, Parhone and Kahane,

speaking of rejuvenation stated that "certain facts tend to prove the possibility for the cells, and even for highly differentiated organisms, which have arrived at a certain stage of evolution, to go back up the current of that evolution". An eminent scientist, G. P. Serviss, recently wrote:

> "Certain metazoans live indefinitely if from time to time the liquid in which they are cultivated is changed, thereby bringing new nutritive material to them and getting rid of their waste products. Now, we too exist in a liquid medium, the blood and the lymph, from which our cells draw their aliment. The endocrine glands supply the aliment and if these glands fail we are now able artificially to recruit them. Soon we can hold up our proud heads with the humble metazoan and say 'We, too, are physically immortal'".

And so, scientific men with visions have refused to accept the dictum that old age is a normal process. They have become fully convinced that the wrinkles, the fading eyesight, and the other evidences of senility all tell the story of endocrine gland depletion—a condition that science has learned to overcome to-day to a large extent.

That rejuvenation is on the verge of conquest, is in fact here with us to-day as a reality, may be judged by the following excerpt from an editorial in the "New York World," July 24, 1924:

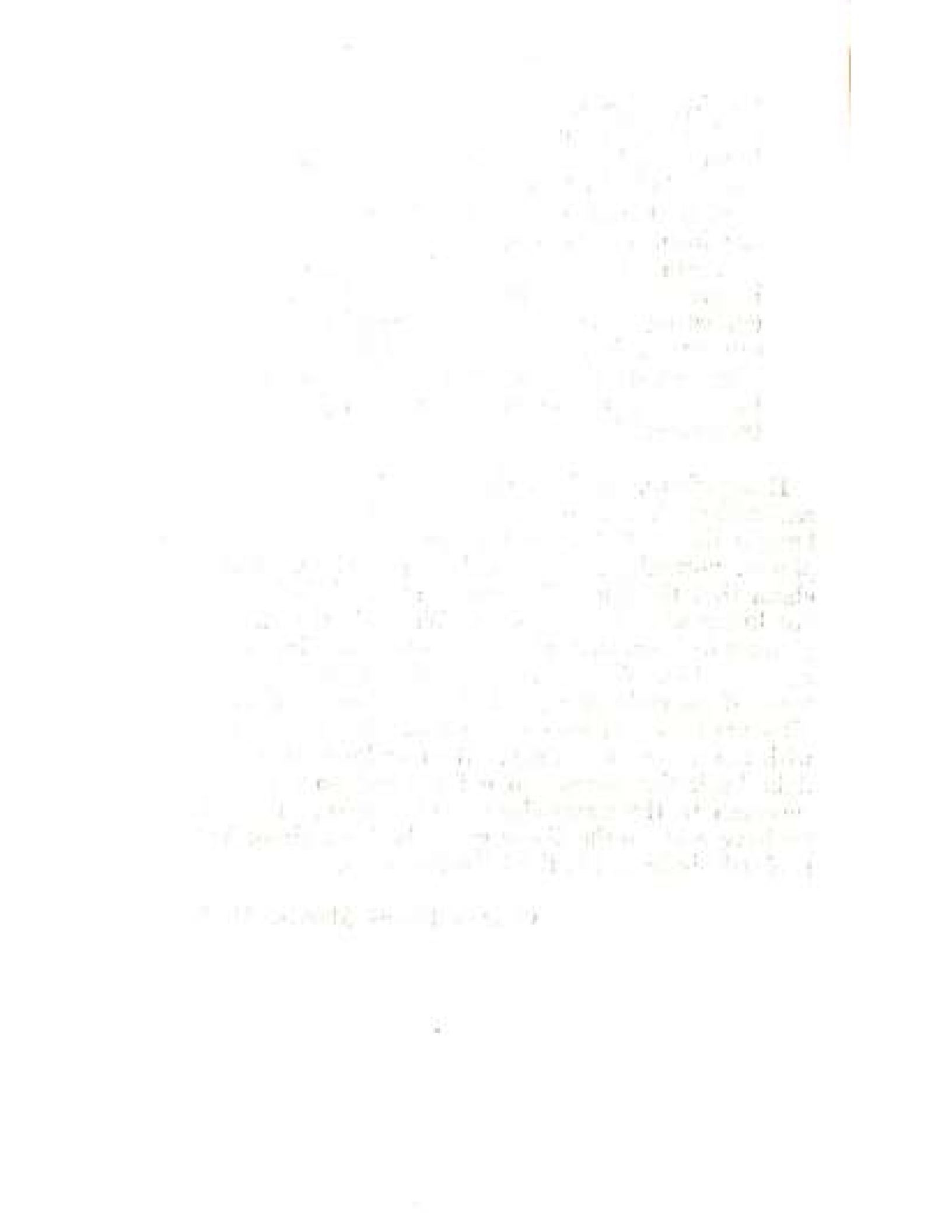
> "Suppose rejuvenation becomes popular and general. What effect would it have on life insurance companies, as regards premiums, profits, forms of insurance in demand, and the statistics of the business?
>
> Life insurance rates are calculated on "expectation tables". But if rejuvenation becomes common the expectation of life will be increased and the companies will have to take this into

consideration in fixing new rates. The classes that buy life insurance are in general forehanded and productive, the very kind of people most likely to be rejuvenated if the process is perfected until it becomes within the means of the insurance buyers.

Again, insurance companies have an interest in prolonging the lives of their policy holders, collecting premiums, and enjoying the use of the money for longer periods. Will the time come when companies will write policies providing a lower rate if the insured takes rejuvenation treatment?"

Everywhere, in fact, the world is awakening to a realization that a new era is at hand in the control of human life as well as in the production of health, happiness, normality, sanity and mental vigor. I do not claim that the impossible can be accomplished, but I do not know what is impossible. We medical men are beginning to learn that what we thought was impossible is now possible. We now realize that through proper treatment of the endocrine glands, in a modern scientific way, ailments that had heretofore completely baffled us yield with the utmost regularity. We now know that we can fight back the assaults of old age and do not need to succumb to the encroachments of senility. How close we have come to the discovery of the Fountain of Youth is clearly indicated in the following pages.

Charles Evans Morris, M.D.



CHAPTER I

THE BODY

A MARVELLOUS CHEMICAL LABORATORY CONTROLLED BY A FEW TINY GLANDS

In order to form an intelligent concept of the whole problem of rejuvenation, it is necessary that we have a fairly clear idea of the human body. This has been the study of scientists from the early days. We find evidences of skull trepany in the Stone Age. Many of the mummies discovered in Egypt show operations of this type performed long before the Christian Era.

Men of inquiring and scientific mind down through all the ages have been trying to solve the riddle of the human anatomy. Piece by piece they have uncovered a new function here and a new function there, until today we have a marvellous understanding of how this intricate organism works. There are still many processes in the body that have resisted the efforts of the best scientific brains in the world.

In a general way, however, we know that the body is a very complex chemical laboratory. The developments made in modern chemistry have proven that the chemical functions performed in this great laboratory are marvellously intricate and marvellously varied in their nature. It seems incomprehensible that people forget that what we are is what we eat, to a large extent. Our food, water and the oxygen from the air are the chemical agents that are utilized as raw materials by the laboratory called our body and which make us what we are. If we eat improper food, the proper chemistry changes do not take place and we suffer many types of ailments there-

from. The food, water and oxygen are converted into flesh, bone, blood, nerve, fibre, plasma or hormones as needed. The most intricate and complex chemical reactions are taking place in the body constantly, day and night. It is important that we understand this basic feature because we do not make any progress whatsoever unless this is kept clearly in our mind at all times. That piece of pie you ate for lunch this noon will be by night partly converted into hair, bone, blood, etc.

The chemical functions of the body are performed not only in the stomach, intestines and organs of what we call the alimentary system, but also in every fibre and every capillary throughout the entire body. New cells are being constantly built up and old ones broken down through this chemical process. It is known generally as *metabolism* and is constantly going on from birth until death. If this process of metabolism could be kept up perfectly and uninterruptedly it would mean eternal life of the cell, which would mean eternal life of the human being. In other words, if it were possible to develop a chemistry activity throughout the body that would keep the cells properly nourished through all time, death would never ensue from what is known as old age. However, there are certain chemistry processes that do take place which bring about degenerative influences in cell structure. These gradually increase until finally the curtain is drawn in the cataclysm called Death.

Through some mysterious control of Nature, the human body is set to operate at a stated rate. This we call generally normal. Any variation from this, due to an upset of the chemical processes in the body, would be abnormal and mean illness. This is exactly what illness means. For this reason scientists for centuries have attempted to segregate the various chemical processes performed by the major organs. The tremendous amount of drugs used are the result of this study and their efficacy in restoring normal chemistry processes to the body depends upon the actual intrinsic value these drugs have in changing the chemistry processes. Some

few drugs are well known by physicians to perform certain actions constantly and naturally and have been a great blessing to the human race. A great many other drugs are not so effective and for this reason many of the doctors' precriptions very often fail to help the patient. In fact, there are millions of people suffering to-day from various ailments which have refused to yield to the multitudinous drugs used in materia medica.

The first picture we must get in our mind to understand clearly any form of treatment is that the human body is composed of billions of tiny cells, each one a very complex chemical laboratory—a gigantic manufacturing plant composed of billions of busy units, the cells. As is well known, we develop from a single cell which through various processes becomes a living human organism. So we see that a single cell is a mighty complicated structure, capable of untold chemistry changes.

We are what our cells are, as we are in reality largely a collection of cells. Every minute cell is constantly undergoing chemistry changes, so that our body as a whole is a very busy workshop. The forces—the energy—needed to keep up this uninterrupted activity come largely from the air we breathe as well as the food and water we eat. These combine in many ways throughout the organism to effect the many changes that result in bone, nerve, muscle, etc., as well as the energy to make the chemistry changes possible. It is very difficult for us to comprehend the full meaning of this constant cell activity, but it is this functioning that, to a considerable extent, determines our physical and mental make-up.

There are many different types of cells and each group has a special function. There is food to be cared for, blood to be made, hair to grow, wear and tear to be replenished and a hundred other jobs to be handled by the cells. Think of the complex character of chemistry combinations necessary to produce the thousands of distinct changes that take place in the human organism

daily—to produce growth, ward off attacks of microbes and to supply the tremendous amount of energy that we use up in a day's activities. What is the master hand that mixes these chemistry products so accurately that a living, vital, powerful human body and brain is the result of a few vegetables, some meat, air, water, etc.? The answer is—the secretions of the ductless or endocrine glands.

The group of cells in various parts of the body that go to make up the endocrine glands have their special job just as the other cells of the body. This job is to produce a magical chemical combination, called the *secretions* or *hormones*. These hormones are sent into the blood stream and are carried to all parts of the body to mix with the different chemical ingredients in the cell and there effect the most astounding chemistry changes. Even a tiny speck of this secretion can find its way into every minute portion of the body and take part in the chemistry changes of every cell.

For example, an inconceivably small amount of the secretion of the thyroid gland can be so thoroughly diffused by the blood that a definite amount reaches every one of the billions of cells, where it serves the purpose of regulating the speed at which the cell works.

There are only a few of these groups of cells we call the endocrine glands and yet their secretions commingle in such a manner that they form thousands of different chemistry combinations. That is, six hormones of one gland and say sixty hormones of another gland combine to effect one chemistry job. Then perhaps fifteen hormones of another gland combine with say five hundred hormones of still a different gland to do a different kind of chemistry job. This series of combinations, which runs into the millions, is known as the "hormone complex".

So every single minute chemistry process that takes place in the tiniest cell is governed by some form of this "hormone complex". In fact, we know to-day that not a single chemistry action in the body is possible without

the influence of the hormones or secretions of the endocrine glands. Therefore, this complex laboratory we call our body is managed and controlled down to the most microscopic part by the magic chemistry that finds its origin in these glands.

It may be accepted as a fact that just so long as the cells of the endocrine glands can manufacture their secretions normally the chances are that the various cells throughout the body will receive the proper chemistry combinations to make their necessary changes. This we call normal metabolism.

The body depends on the ductless glands for its very existence. If they fail in any small way, the cells of certain organs are affected and trouble arises. If we can bring about normal functioning of any of these glands that have fallen down in their work we can remedy these troubles. Therefore, alert medical practice to-day is centered around these glands as the controlling factors in all chemistry processes of the body. To-day we are satisfied that we can solve all our problems of disease and old age through the endocrine glands.

As Bailey says:

> "We are the creatures of these glands! Men and women and children are what they are because of these little glands. This is the modern conception of humanity or human nature, and this idea has been proven in the laboratory and clinic. No longer must we consider ourselves a mystery, guided by some unseen and unknown fate, excepting as that mysterious guide carries out its will through these little glands.
>
> We are large or small, beautiful or ugly, fat or thin, brilliant or dull, have red hair or black, curls or straight hair, freckles or peachy complexion, large teeth or small teeth, sane or insane, gay or morose, wicked or angelic, affectionate or frigid, get old early or late,

successful or a failure and a thousand more things—all because of these glands.

Why Johnny is slow with his studies, while Willie is at the head of his class, is merely the difference in the amount of chemical fluid produced by a little gland in the throat. Johnny's thyroid gland is below par, so he is dull and stupid, while Willie's thyroid is excellent, so he is bright and keen-witted.

No matter whether you are normal or abnormal the endocrine glands exert such an influence on the body chemistry through their secretions that they absolutely dominate and decide what you are. That you have larger arms than normal or shorter legs than normal, that you have hair on your chest while others may have it largely on their legs or back or have none at all, that you are fat below the hips or vice versa, or that you are what you are in every respect, perfect or imperfect, is decided by these tiny glands.

It may be taken as a definite fact that the internal secretions of these glands, with their mysterious but powerful influence upon the brain and nervous system, as well as upon all the functions of digestion, blood-making and cell-building generally, are not only the arbiters of reactions and emotions, but that they actually control character and temperaments, whether for good or ill."

Our knowledge of the chemical substances produced by these glands and of the means whereby they govern the marvellously intricate changes in the cells is scarcely half a century old. Already, however, a straight path has been blazed through a wilderness of theory and obscurantism. Sajous, Bailey, Cannon, Brown-Séquard, Banting, Abel, Kendall, Berman and scores of others have established, beyond a question of doubt, facts which are undeniable and now generally admitted.

The function of the thyroid gland has been clearly defined. The complex substances which make up the secretion of this gland have been definitely isolated. Their chemical reactions are known. The pituitary, the adrenal, the pineal, the thymus, the pancreas, the sex glands—all have yielded up certain of their secrets.

We know that the physical appearance of the individual, his psychic traits, or what might be called the chemistry of his soul, are demonstrated in a great measure by the character and amount of the internal secretions of his various glands. Normal individuals, as well as those whose abnormalities are marked, are distinctly classified by students of endocrinology, according to the preponderance or deficiency in the internal secretions which rule in their make-up.

And not only individuals, but families, nations and races exhibit definite traits referable to the character of their internal secretions, which distinctly classify these individuals, families or races with this quality or difference. In fact, the index of the internal secretion of any given individual may, at some not distant date, constitute the means of measurement, which will fit him into a distinct niche in our social, ethnological and physical system.

More and more scientists are coming to realize that the general form and external appearance of the human body depends largely upon the functions of these glands. The length of our arms and legs, the shape of our nose, ears, teeth, the amount, texture and distribution of hair on our bodies, the quantity and location of our subcutaneous fat, the sound of the voice, the length of the fingers, shape of the nails, and all the other external characteristics of an individual are conditioned upon the type and quantity of the internal chemical secretions produced by the endocrine glands.

We are rapidly coming to the conclusion that the mystery of human personality, that indefinable something that makes one person different from every other person on the face of this globe, is, in large measure,

due to the differences that exist in the character and quality of his internal glandular secretions, as compared with the character and quality of the secretions of every other living individual.

Even history can now be studied in the light of the qualities of the endocrines of those who have brightened its pages or smeared them with a trail of blood and lust. The great geniuses of all ages—the Homers, Shakespeares, Michael Angelos, Bacons, Washingtons, Lincolns—fall into certain well-defined endocrine groupings, while the Neros, Caligulas, Atillas and Kaiser Wilhelms all fall definitely into a category clearly recognized by the student of endocrinology. Perverts of the Jack-the-Ripper type, the individuals showing definite traits of Sadism, masochism and other aberrations are not only of distinctly abnormal endocrine types, but could even be relieved of these abnormalities through proper treatment of their glands.

The brilliant and precocious genius exhibits definite traits, observed in his physiognomy and in his various physical measurements and developments that classify him, endocrinologically, as a genius. The mentally backward, the moron and the imbecile, exhibit in their physical measurements very definite evidence of subnormal glandular activity and are readily classified.

Darwin was an outstanding example of a poor set of adrenal glands, so was Herbert Spencer. Pituitary abnormalities are also most common, their symptoms raging anywhere from severe headaches to violent attacks of epilepsy. Among notable historic instances of this deficiency we find Julius Caesar. Mohammed was another example, as were Byron, Flaubert and Dostoyevsky.

Dr. Louis Berman says:

> "Every bit of evidence points toward the glands of internal secretion (endocrines) as the holders of the secrets of our inmost being. They are the well-springs of life, the dynamo of

the organism. In trailing their scent we appear upon the track not only of the chemistry of our bodies, but of the chemistry of our very souls.

The most precious bit of knowledge we possess to-day about man is that he is a creature of his glands of internal secretion. That is, man as a distinctive organism is the product of a number of cell factories which control the parts of his make-up. These chemical factories consist of cells which manufacture special substances, which set upon the other cells of the body and so start and determine the countless processes we call Life. Life, body and soul emerge from the activities of the magic ooze of their silent chemistry."

I quote from an article by Russell Porter that appeared in the "New York Times" on January 20th, 1924.

"The individual man, as well as the universe and mankind as a whole, is also the subject of much eager scientific research. Biologists and physiologists expect that the study of the ductless glands, which give off secretions within the body, in contrast with the glands that emit external secretions, will result in wonderful new discoveries in the future.

The solution of the problem of rejuvenation, the prolongation of life and the blessing of children in homes previously childless, are among the possibilities predicted for this field of science."

Prof. R. G. Hoskins of the Ohio State University has done splendid work in the field of the endocrine glands and I quote from an article by him in the "New York Times" on January 20th, 1924.

"It has long been believed that lack of pituitary secretion results in dwarfism, and excess in gigantism. Evans and his collaborators

at the University of California have developed a growth-stimulating extract which, injected into rats, produced apparently true gigantism. They have found, too, that their extract is a sex depressant in females. This work seems to promise a remedy for correcting growth and some other metabolic anomalies.

Allen and Doisy have isolated from the ovaries a powerful physical and psychic sex stimulant. Baby rats just weaned can be brought to the breeding stage in two days. Mammary gland and internal organic development is stimulated. It is probable that many a childless home will be blessed by this discovery. A countervailing sex depressant has been fairly definitely localized in the corpus luteum and it, too, may soon be available in potent extract form.

The part played by the endocrine glands in determining the individual or race characteristic seems important. Adequate knowledge on this point will probably await the isolation of the various endocrine principles. When they are isolated and chemically identified, an abundant supply can probably be produced artificially."

"The problem of rejuvenation will be solved by endocrine researches."

"Old age and death are merely the 'running down' of certain necessary cells. Certain endocrine products are known to have a profound influence in building up the body cells. It is probable that the thyroid and pituitary glands rather than the sex glands will prove to be the important rejuvenating organs."

Dr. McMurrich in a lecture given by him in 1923 made the following remarks:

"More recently still another line of investiga-

tion has attracted those interested primarily in questions of form and structure. The physiologists had demonstrated the existence in the body of special organs which manufactured substances influencing in definite ways the chemical activities of the tissues. They had shown that these so-called endocrine glands, or ductless glands, such as the thyroid, the pituitary and the islands of the pancreas, produced substances necessary for the normal activities of the body and that a lack of these substances resulted in definite and serious disturbances of these activities."

Dr. Haggard, President of the American Medical Association, in his address at Atlantic City on May 26th, 1925, said:

"What is more astounding than the revelation in the last few decades of the part played in our bodies and lives by the wonder-working ductless glands. The thyroid gland presides over our growth; its absence makes the gnome-like, grotesque idiot, the cretin. Administration of the life-giving thyroid extract veritably restores the dead to life and brings dwarfed bodies back to blooming youth.

It seems incredible that the pituitary gland at the base of the brain, weighing only two grams, will, when diseased cause the prodigious growth of a giant, and when its secretion is deficient produce the enormous fat deposit of the pathologically obese.

The greatest romance of the past few years in medicine was the discovery of insulin by Banting. The wizardry of rescuing the diabetic patient by this remarkable discovery is truly a marvel."

Professor Hoskins recently remarked:

> "It is startling to think that only three grains of thyroid gland extract a year stand between any of us and imbecility."

Professor Starling in his Harveian oration in 1923 made the following statement regarding these glands:

> "When I compare our present knowledge of the workings of the body and our powers of interfering with and of controlling these workings for the benefit of humanity with the ignorance and despairing impotence of my student days, I feel that I have had the good fortune to see the sun rise on a darkened world, and that the life of my contemporaries has coincided not with a renaissance but with a new birth of man's powers over his environment and his destinies, unparalleled in the whole history of mankind."

Sir David Bruce, President of the British Association for the Advancement of Science, in his address at Toronto in August, 1924, said:

> "I can only briefly allude to the astonishing advance in our knowledge of the diseases caused by a defect or excess of secretion of the ductless glands. Many of these discoveries are among the fairy tales of science.
>
> There is one point of likeness between the vitamins which we have been considering and these glandular secretions or hormones, as they are named. Just as we have seen that the presence or absence of an extremely minute quantity of a vitamin may determine growth and health or disease and death, so an extremely minute quantity of glandular secretion may have a similar effect.
>
> The anterior lobe of the pituitary gland is a very small body, yet an excess of its secretion will cause a child to grow into a giant; a de-

ficiency, and the growing child will remain an infant.

The best known of the ductless glands is the thyroid, and the effect of its secretion is truly marvellous. A deficiency, and the child grows up a heavy-featured, gibbering idiot. Rectify the supply of thyroid secretion: the heavy features disappear, the eyes brighten, the intelligence returns, and instead of the former heavy-jowled imbecile you have a bright, happy and normal schoolboy. On the other hand, if there is an excess of the thyroid hormone, exophthalmic goiter, or Grave's disease, is the result. Remove the redundancy and health returns".

Dr. Lewellys F. Barker in an article in "Hygeia" (August, 1924), entitled "Can We Change Heredity?" remarks as follows:

"An interesting example of the way in which our newer knowledge of the genesis of the Human Individual is throwing light on his forms and functions is in the domain of the internal secretions. It is known that there are certain glands in the body, known as endocrine organs, the functions of which are of the first importance, not only for changes in the structure of the body during its development but also for the way in which the functions of the body are performed during every day life. Among these glands are the thyroid, the pituitary, the suprarenal, the pancreas and the sex glands. The stature of a person, his weight, the texture of his skin, the distribution of the hairs on his body, the shape of his bones, the frequency of his heart beat and the energy manifested in his activities seem to a large extent to be dependent on the effects on the grow-

ing tissues of the chemical substances produced by these glands.

Thus, a person who, during development, has had an overactive pituitary gland, may become a giant, whereas one who has had an underactive pituitary gland may become a short, fat individual with imperfect sex organs.

Or, should the thyroid become markedly overactive, the patient's eyeballs will protrude; his heart will beat, say 120 times per minute instead of 70 times; his fingers will tremble; he will sweat profusely and he will lose weight rapidly; whereas should the thyroid become markedly underactive, he will grow fat and stupid, his skin will become thick and wrinkled, and his hair will fall out.

If the internal secretions of the pancreas are not satisfactorily produced, the person will be diabetic, large quantities of sugar will appear in his urine, and he will complain of an intolerable thirst."

In a recent magazine article by Bailey, we read:

"It would be a hardy man indeed to say that if a child were brought up under the most aseptic conditions and properly nurtured at all times he or she might live to be several hundred or several thousand years of age—yet we have no way of knowing to-day that this is not entirely possible.

There is no doubt that the most common cause of death is lack of resistance to disease, etc. If this resistance can be built up, and it is being built up in many ways, there is no apparent reason why the organism should ever die.

No one knows what man's ultimate destiny is to be. We do know that the pace is increasing by leaps and bounds. We do know that we reach a type limit at an early age. We do

know that there are many physiological changes that take place during childhood and adolescence. We do know that puberty arrives at about the age of twelve to fourteen in the average boy and girl. It is evident that there must be some regulation of man's organism by nature that seems to follow inexorable laws.

What is the key to the secret? The hand of science points definitely to the machinations of several tiny glands in our body. These appear to be the arbiters of our destiny. The complete mastery over them means that man will have complete mastery over himself. He can then regulate puberty, menopause, potency, virility, mentality and life processes at will.

Since the world has come into possession of such vastly important knowledge in the matter of the endocrine glands, it has become the highest aim of science to find some definite means of controlling these all-important dictators of destiny.

Since their relative balance makes us what we are in appearance, character, mentality, successfulness and usefulness, probably the most astonishing of all men's discoveries is his ability to regulate these at will so that life, energy and character may be redesigned at will—so that health, energy and longevity with full vital powers, may be given to those of advancing years.

It is now the absolute belief of the foremost scientists in this field, as evidenced by a world of experiment and success, that if the endocrines of an individual could be brought under careful observation and proper correction throughout the entire life, there is absolutely no limit in years to which man might aspire. The statement on the part of many biologists that it is believed men can live a thousand

years, is in no sense a wild fancy. Men are living to-day who, it is my belief, may retain their full active energies, if kept under the care and attention of the right scientists, into hundreds of years. Thousands of men and women have been rejuvenated by the newer processes, some of them the most important men of two continents.

Old age, like germ disease, has been brought under the microscope of science. Forty years ago the control of plague and pestilence was considered beyond men's power—yes, even a visitation of the avenging hand of the Almighty. To-day the enormous success of preventative methods is known to everyone. Within twenty years we have learned more about the problems of the endocrines and the phenomena called old age than all man learned in all of his previous existence on this earth. Old age is now coming under the same control as germ diseases. Yes, verily, old age is, like any disease, on the very verge of conquest."

And so this remarkable chemical laboratory we call our body is yielding up its secrets by way of the endocrine glands which control all its processes. It becomes apparent to all that through these glands we must make our battle to effect rejuvenescence and erase the host of ailments that now burden mankind to the extent of incapacitating or limiting four fifths of our entire number.

CHAPTER II

THE ENDOCRINE GLANDS

It was way back in 1855 that Addison discovered, by experiment, that the yellow skin disease which bears his name was due to a defection of the little cellular capsules now called the *adrenals*, lying over the kidneys. Some years later Charcot, Kocher and Reverdin demonstrated effects due to the absence of the functional activities of the thyroid gland which lies in the neck. In 1886 Mobius first expressed the idea that certain well-known diseases were directly related to an abnormally increased activity of certain ductless glands.

But it was not until 1889 when the great Brown-Séquard, now standing as a lighthouse in the development of modern physiology, reported to the Biological Society of Paris concerning his experiments, which demonstrated that the endocrines furnish the blood with substances which when carried by the blood to distant-lying organs, influenced them profoundly. The name of Brown-Séquard, like that of Pasteur, has now come into its own as one of the great names in the Hall of Medical Fame.

It was Brown-Séquard who first formulated definite endocrine theories, based them upon experiments, attracted the general interest of the world to them, and opened up a wholly new field for human thought with regard to physiology and pathology. In rapid succession all types of diseases that were formerly thought to be of constitutional origin were added to the group, and the understanding of the endocrines grew at a pace as surprising as the recent growth of knowledge in radio.

Following Brown-Séquard came in rapid succession a

list of brilliant scientists too numerous to mention, yet whose names are great in the history of modern science. These look to the great originator, Brown-Séquard, as a shining orb of this new day of knowledge. Sajous in his masterful work on the endocrines acknowledged the world's debt of gratitude to Brown-Séquard and dedicated his work to this great master.

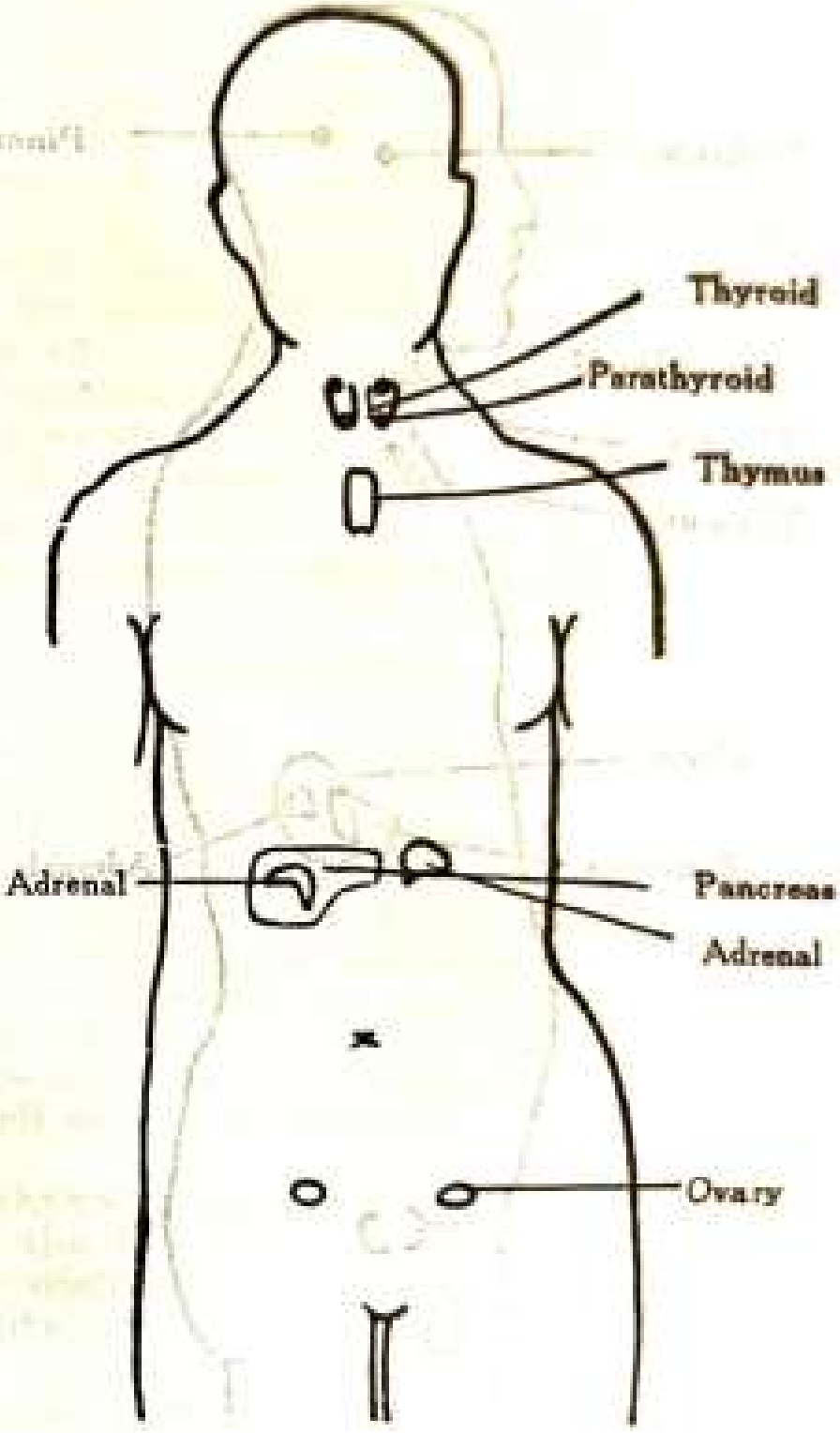
As it happens throughout all of man's progress toward civilization and conquest of himself and the world he lives in, discovery after discovery has been made without the faintest realization of the importance of those discoveries when fitted to other discoveries and thus woven into the fabric of man's affairs. It was little realized when the principle of the internal combustion engine was first discovered by Otto that it was to be the key to automotive transportation over millions of miles of road, and the impulse which was to carry men on artificial wings through the heavens above.

It was little realized as discovery after discovery concerning the functioning of a heretofore unnoticed gland were piled up that the accumulation was so soon to make so important a science. It was still less realized by Mme. Curie, Rutherford, and others that, with the fathoming of the mysteries of atomic energy, new and unknown rays were to be discovered which, by combination with endocrine knowledge, was to relieve mankind from its most serious handicaps and to have so vital a bearing upon human efficiency, mental capacity, health and longevity.

To-day our knowledge of the endocrine glands is almost a matter of mathematic precision, though there is much yet to be learned. These glands have often been called the ductless glands or the glands of internal secretion. The name "endocrines" is used most frequently, however, in reference to them. While an inkling of their dominating importance in the human body may have been gleaned from the previous chapter, yet a detailed description of them and of their functions as we understand them to-day will be of value to the reader.

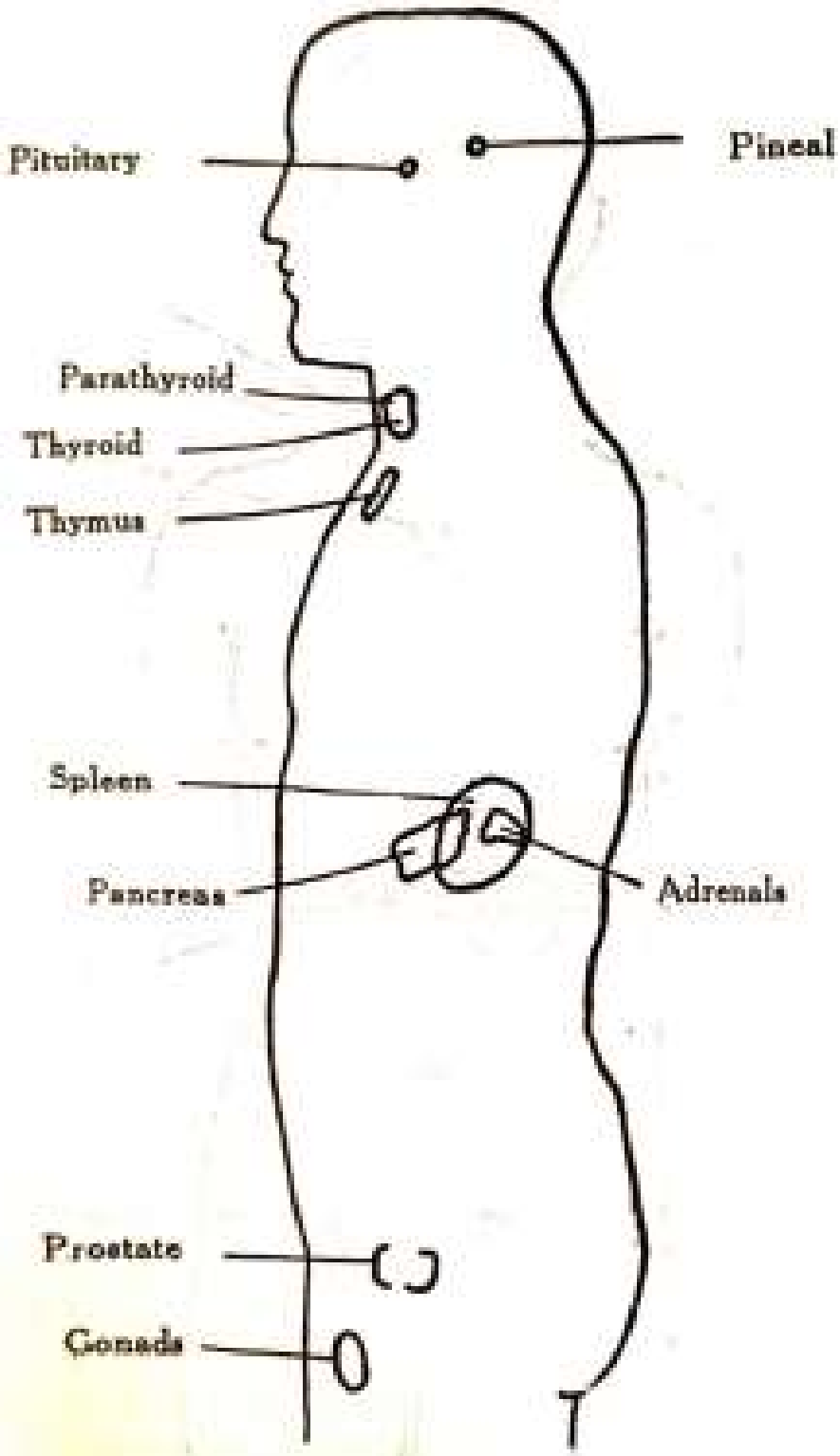
APPROXIMATE LOCATION OF THE PRINCIPAL ENDOCRINE GLANDS.

(Front view)



APPROXIMATE LOCATION OF THE PRINCIPAL ENDOCRINE GLANDS.

(Side view)



The body contains, of course, a great many glands that have been known since the dawn of time. There are two kinds of glands in the body: 1—The glands that secrete *externally*, such as the salivary and sweat glands; 2—The glands that secrete *internally*, which are the endocrine glands. As they contain no ducts they are called the ductless glands. The substances which these glands produce are not excreted, but are poured into the blood stream. The name for these substances is *hormones*. Whereas the duct glands, as the sweat gland, pass their products out of the body, the ductless or endocrine glands on the other hand pass their products (hormones) into the blood, by which they are carried to all parts of the body to take part in the various chemical processes throughout the system. Three of these glands (the pancreas, testes and ovaries) serve a double purpose in that they are both external and internal secreting glands, but we are concerned only with their internal secretions, the hormones.

THE THYROID

Astride the windpipe, near the larynx, we find two small colloidal masses known as the thyroid gland. This gland furnishes the "go ahead" that characterizes all healthy happy life. Thus it is a direct index of one's usable energy. While it does not produce, yet it accelerates, lubricates and transforms our energies.

The thyroid controls the speed at which chemical processes take place in the human organism. The hormones it manufactures are carried by the blood to every cell in the body where they govern its speed of action.

The thyroid very definitely marks the outer coverings of the body—the skin, the skin glands, the hair and its distribution, the mucous membranes, and the irritability and the preparedness for response of the nerves through the vegetative or autonomous system. (This is the nerve system which operates independently

of the brain, making the heart beat and other organs operate constantly from conception until death). It raises the energy level of the brain and indeed of the whole nervous system as a by-product of its awakening effect upon all the cells of the body. It speeds up cellular processes, facilitating energy production. It is responsible for the trick of catalysis, by which all processes are speeded up through chemical re-agents. It lubricates and transforms energy, thus permitting large and rapid fluctuations in physical energy, such as elasticity for supreme energy mobilization at time of great mental or muscular effort.

The thyroid is especially concerned with the shape, form and finish of the organs of the body and the external appearance, including much of the bodily and facial form called beauty.

The thyroid and gonads (sex glands) are very closely and sympathetically related. With decline or destruction of the gonads, the thyroid withers or swells, the speed producer ceases to call upon the great chemical laboratories, such as the gestative system, for more and more fuel, for more and more "steam" with which to enable the body to indulge in more work and more play. The fire of youth burns out and, like the eunuch or the eunuchoid, the quick, animate, alert becomes the slow, heavy and stupid.

The thyroid gland is a marvellous little co-operator. It tries to help everybody. It sometimes "falls down" in the attempt, because it is so frequently overworked. When it fails for any reason it frequently results in an enlargement of the anterior pituitary gland in the head, which brings in its train a whole range of complex ailments.

The thyroid is closely related to the thinking process. The storing away of ideas in the brain is conducted similarly in all brains, being the result of the impressions reaching the brain through our several senses of sight, hearing, smell, touch and taste. But the speed with which the nerves may conduct ideas or thoughts

from neuron to neuron in the brain depends upon the way these nerves are fed by the thyroid gland. In other words, the thyroid is indispensable to the laying away of a substantial and useful memory deposit—without good thyroid, memory is always faulty. Millions of men and women scratch their heads and say "I just can't think of that", although they know it is in their heads. And it is there, as evidenced when the fact is brought to the mind by a new eye or ear impression all the attendant facts are immediately available. While it cannot be said that memory is a thyroid function, utilization of memory material is possible only with proper thyroid activity. For the thyroid secretion feeds the tissue between the cells and the brain, preventing the clogging and thickening—the barrier to the free passage of nerve impulses.

HOW TO DIAGNOSE THE HYPO-THYROID TYPE

Those with too little thyroid activity (hypo-thyroid) are readily distinguishable by many evidences:

When we examine the head we find that the features are generally coarse and irregular. There is a broadness to them that is unmistakable—the nostrils particularly being broad and thick. The mouth is generally large while the lips are thick and prominent. The negro types are definitely hypo-thyroid. Eyes are widely separated, dull, sunken, dim and lustreless, while some types may be even slant-eyed.

Taking the body as a whole, there is a tendency toward a deficient growth in stature. One is thick set with small bones. Certain types of dwarfism are due to hypo-thyroid. Hands are short and coarse, fingers thick and club-like, while the fingernails grow slowly, are brittle

and often cracked. The tendency to gain weight readily is an index of this type.

A glance at the teeth shows them to be generally poor. There is a lack of proper development, the enamel is soft and they decay easily. As a rule they are widely separated.

In common with poor functioning of the bodily processes generally, the hair also suffers. It is scanty, brittle and coarse, irregular in its growth and lacks lustre. This type gets bald easily. The hair falls out readily—in bad cases in handfuls. The eyebrows, especially the outer third, and eyelashes are noticeably thin. In pregnancy the hair falls out readily.

The skin is seriously affected. It is usually, thick, dry and harsh—often rough and coarse. The face is usually slightly puffed and the complexion sallow. There is a distinct coolness to the skin—the hands in particular get cold readily and have a bluish tinge. Raise the skin on back of hand with your thumb and forefinger—you will observe that it does not snap back readily. It behaves more like putty than fresh live elastic. Hence the skin wrinkles easily and one who would avoid wrinkles must keep the thyroid up to par.

People of this type usually have a slow pulse, low bodily temperature and reduced blood pressure. There is also a decreased libido (sex desire).

A general feeling of languor and fatigability is observed. Hypo-thyroids "catch" diseases easily and are often victims of chronic headaches, obstinate constipation, neuralgia, rheumatism, anemia, shortness of breath, etc. They are very susceptible to colds, tonsilitis, cystic goitres and skin diseases of all kinds. Most skin ailments can be cleared up when the thyroid is speeded up. This type is prone to

deafness and represents a large part of our so-called dementia praecox cases. The appetite is seldom good. In women the menses are scanty or delayed and pregnancy is difficult. They are slow in thought as well as in movement. Usually taciturn, listless, apathetic, often inarticulate and as a rule exhibit little initiative. Early to bed and late to rise is the usual rule. Seemingly lazy but really tired and in serious cases dull, stupid and morose. There is with all of this type a general mental and bodily sluggishness. The memory is poor, they are unable to form rapid conclusions and portray an inadequate mental capacity. Always slow getting under way in the morning—they lack "pep". Peculiarly, their sleep is restless and disturbed by dreams. They are the kind that must be called several times and are late at the breakfast table as a regular thing.

Women of normal thyroid action become very frequently hypo-thyroid at pregnancy and are slow, dull or apparently stupid. After menopause they lose their former vivacity and become dull and stupid. The rule is that they either get thin and sour or fat and stupid.

Boys at puberty appear to be lazy, listless, dull and "heavy", while girls become sedate, dreamy, bashful and morose. At school sub-thyroid children are regarded as vicious and stupid whereas the poor kiddies are simply the creatures of a tiny gland. A more careful study of this factor will probably revolutionize our educational methods.

Where the hypo-thyroid condition is of a nature to constitute a real disease, such as cretinism and myxedema, we find all the above psychic conditions magnified many times to the point of absolute idiocy and dementia.

HOW TO DIAGNOSE THE HYPER-THYROID TYPE

Now let us examine the hyper-thyroid types—those who have more than the "normal" supply of thyroxin. Let us examine the external evidences and psychic reactions.

The head is totally different from the hypo-thyroid type. In the hyper-thyroid we find a narrow head—clean cut and delicately modelled. The face is more or less oval and cheeks hollow. Brow is wide and high. Eyes are very prominent—large, bright, brilliant, protruding, even "poppy". Nose is straight and high-bridged. Lips are "sensitive." If there is an abnormal amount of white around the pupil of the eye it indicates emotional instability and a passionate nature.

I see many patent medicines advertised to make "skinny" people fat, but nothing can make the hyper-thyroid fat. He is of the lean type that remains thin no matter how much he eats—and he is usually a good eater. He is tall—of unusual height, but seldom approaches giantism. Just the tall, lean, lanky person we all recognize so readily. Children of this type seem healthy and active, but careful inspection shows a too rapid growth in legs, arms and fingers while the trunk and neck are long and narrow.

The teeth are usually very good. They are as a rule small and regular—but glistening, pearly and transparent. If one becomes a hyper-thyroid as a child, the permanent teeth will come in early, attain a good size and be firm and hard.

This type has lovely hair—thick, wavy and often curly. The eyebrows and lashes are long.

It is not bushy, but of luxuriant growth, fine texture and lustre. In men the beard and mustache grow rapidly.

The skin has a high warm color with slight flushing over the cheekbones. This type blushes easily and the skin gets fiery red in anger. The skin is thin, soft, white, velvet-like and moist—with frequently annoying perspiration. By stroking the finger over the shoulders or breast we leave a pink or reddish mark.

Pulse is rapid, temperature is high and blood pressure is usually above normal, with irregular heart action and rapid breathing. There is an early puberty and sex maturity, denoting an erotic type.

Children of the hyper-thyroid type seldom get children's diseases—excepting measles—while adults are easily prostrated by heat and emotion, suffer with indigestion, acidosis and diarrhea. They supply most of the cases of exophthalmic goitre.

There is often a noticeable twitching of the eyelids and face while night sweats and insomnia are common. This type can't "hold their liquor" very well—alcohol readily affecting them. Women have frequent menses with long and profuse flow—although some may have delayed and scanty menses.

They are emotional, over-excitable, high-strung, irritable, peevish, easily upset, chronic kickers. They get up early, are on the go at full speed all day, retire late and then plan in bed for the morrow. Always active, alert, energetic, enthusiastic, imaginative. Impulsive, wide-awake "live wires". They talk fluently, rapidly and continuously. Are free with plaudits as well as censure. They continuously crave excitement and activity—ever restless, planning, seeking, dreaming, doing. They are

often magnetic personalities—the centres of attraction—yet erratic, unstable, subject to moods, brain storms and emotional outbursts. Hysteria with mania and psychic storms is not unusual.

Adolescent girls of this type are excitable, nervous, restless, sleepless. Boys are irritable and quick tempered. A woman before menses feels hot, tremulous, sleeps badly—does not know what to do with herself. She has difficulty in concentrating on conversation or on any activity and gets readily excited to the point of hysteria at times. At pregnancy and menopause this type is subject to mental aberrations until the glands readjust themselves.

The above outstanding features of the two thyroid types cover a wide variation—depending on whether the activity of the thyroid gland is just a trifle above or below. Probably none of us have a normal thyroid all the time; we may go up or down the scale a bit each day and hence exhibit some of the psychic characteristics of both the hyper-thyroid and hypo-thyroid types.

THE ADRENALS

Situated astride each kidney we find a clump of fatty looking cells, shaped like a cocked hat, to which the name of adrenal glands has been given. The outer portion of each gland is named the cortex and the inner portion the medulla.

The cortex, in the human embryo, arises from the same cellular patch that forms the sex organs (ovaries and testes). This relationship is clearly expressed in later life by their close sympathetic and functional relationship with the sex glands and their support of sex tone, extended maturity and long, virile life.

As Berman says:

> "But not only are sexuality and the conduct of the secondary sex characters connected with the adventures of the adrenal cortex. The development of the master tissue of the body, the brain, the pride and darling of evolution, is in some subtle way correlated with it. The adrenal cortex contains more of the phosphorus-containing substances of the general nature of those found in the central nervous system, than any other gland or non-nervous tissue of the body. During human intrauterine life the adrenal glands are large and conspicuous in the first half of the second month, being twice as large as the kidneys. Most of the *relatively* huge size, which happens in the human alone and not in other animals, is due to enlargement of the cortex. Should this preponderance of the cortex over the medullary (or inside) portion not occur in the human, the brain fails to develop properly, or an entirely brainless monster is developed. The human brain, therefore, owes its superiority over the animal brain to the adrenal cortex. The growth of the brain cells, their number and complexity, is thus controlled by the adrenal cortex."

On the adrenal medulla science has lavished much attention. Its secretion has even been produced synthetically. The necessity and importance of the adrenal medulla may best be realized by the result of its functioning. Add adrenalin to the blood and instantly a mighty transformation takes place. There is a tremendous tensing of the nervous system, nerve cells become more sensitive to stimuli, the great reservoirs of blood, the liver and the spleen (reservoirs containing one fourth of all the blood), pour forth billions of red corpuscles into the blood stream, the heart beats more strongly, the eye sees more clearly, the ear hears more distinctly,

the breathing becomes rapid, the temperature rises, the hair becomes erect, the fatigued muscle regains its tone and strength, the brain becomes alert and clear—in fact, all physical and mental processes speed up to an astonishing extent.

What causes this marvellous transformation in the soul of living man is now an open book. The adrenal is the gland of combat or flight. During the long rise to power of the human race, the adrenals were man's bulwark in the survival of the fittest. The supreme emergency power for fight or flight was and is furnished by this inconspicuous little organ long passed over by the physiologist as a mere fatty excrescence of the kidney.

A thousand strange and wonderful effects upon the secondary sex characteristics, such as the pitch of the voice, hair on the face, other hair distribution, feminine masculinity and masculine effeminacy are directly traced to the adrenal-medulla, the arbitrator between the brain and the sex organs, from which arise that multitude of desires or inhibitions which completely color the life of every individual.

Neurasthenia, the popular diagnosis for listlessness and apparent nervous deficiency, nervous prostration—the temporary breakdown due to over-demand on the emergency supply of energy—are in fact only and solely an expression of adrenal insufficiency. Mental and muscular sluggishness, languor, a state of perpetual tiredness, or a recurring period of excess energy followed by days of recuperation, perhaps in bed, spell adrenal incapacity, and can be cured only by inducing this tiny laboratory to produce more of the life-giving fluid. America of all countries is the land in which this adrenal reserve is used up with lavish disregard of consequence. The hurry, the bustle, the tumultuous rush, the keen competition, all predispose to the wasting of energy which results in the draining of the adrenal reserve.

HOW TO DIAGNOSE THE HYPO-ADRENAL TYPE

First we will consider the hypo-adrenal person—the one whose adrenals are tired out or exhausted, either congenitally or due to the stress of modern American life, and those who do not get enough of the magic substance from their glands to enable him or her to enter the lists and win out in the big battles of life.

This type is usually short, stumpy and somewhat obese—although if one has good adrenals up to middle age these characteristics may be lacking. The same holds true of the hair. Those who have poor adrenals in early life have a very scanty supply of hair, while a failure of adrenals in later life may not affect the hair growth.

The hypo-adrenal can be readily detected when we examine the skin. An excellent test is to stroke the shoulders and down over the breasts lightly with the finger. It will leave a white mark. The skin of this type is very sensitive to cold. This is particularly true of the hands and the feet. The common saying "He got cold feet" seems to have a biological basis when we study the hypo-adrenal. In anger the skin becomes dead white. Usually the skin is soft and moist, as in the hypo-thyroid types previously examined, the feet and hands feeling clammy. However, some hypo-adrenal types have a warm skin due to the effect of other glands. Fair people have moles while others exhibit irregular blotches on neck or face. In serious cases there is a very marked pigmentation of the skin as well as of the teeth, with a darkened color.

This type does not take full deep breaths.

The breathing is shallow and the blood pressure is usually low. Pulse is below normal and the body temperature is low. Men of this type are not very virile.

The sub-adrenal is always tired out. This is a general mental and particularly mascular fatigability. The doctor diagnoses this languid, dead-tired, all gone feeling as neurasthenia or just plain asthenia. It is the great American disease because we are overworking our adrenals in the high-pressure type of life we lead.

With a lowering of muscular tone we find many ailments of common occurrence—asthma, tonsilitis, vertigo, chronic constipation, auto-intoxication. Heart palpitates readily. There is a loss of appetite. One easily falls a victim to tuberculosis, influenza, diphtheria, etc. Sub-adrenal types are characterized by a general constant weakness.

The mental reactions observed are a direct result of the physical and chemical activities of the body. One sees a great lack of initiative with chronic and obsessive indecision. There is mental instability and a tendency to worry. This type is often meek and timid, usually lacking courage. Theirs is a distinct feeling of mental insufficiency and fatigability, nervousness, easily tired, wandering sensations and insomnia. No great zest to do things, seemingly tired of life, languid and weary while awake, lazy in business, easily led, a prey to constant fear and weak among friends. Apt to go off the handle at the slightest provocation with complete exhaustion afterward. Often regarded as hazy and crazy. Sometimes hysterical and usually unstable equilibrium. Extremely submissive.

HOW TO DIAGNOSE THE HYPER-ADRENAL TYPE

The hyper-adrenal type, that is, the person with a good set of adrenals that are producing more than the normal amount of secretion—is just the opposite from the sub-adrenal. In fact to have too much adrenal secretion, to be hyper-adrenal, is a condition much to be wished in all of us with a few exceptions as noted below.

These types are known by their hard, firm muscles. Young girls are, however, apt to be too plump, even obese, with rather large breasts.

This is one of the hairy types. Men have hairy chests and face, especially noted over the cheek bone. Women have hair on the back and on the upper lip as well. If they are too much over adrenal they are apt to even produce a beard or mustache. The hair on this type is thick, coarse, dry and kinky. So while it is a virtue in men perhaps to have hyper-adrenals, in women it gives too much masculinity as far as the hairiness is concerned and is largely the cause of the rapid growth of depilatory preparations. By readjusting the glands to effect a proper balance, the hair on woman will disappear from the places where it naturally should not be.

The skin of this type is usually freckled and dark in color. It is easily goose-pimpled and at times shows liver spots. It often has the appearance of the sub-thyroid skin. If there is a hyper-thymus as well, the skin will have excellent texture instead of being dry, thick, coarse, rough, harsh and cold.

The hyper-adrenal type have good teeth. the canines are large, sharp and powerful.

Teeth as a rule are yellowish with reddish brown tinge on grinding surfaces.

The head is large and round with a heavy broad face and somewhat prominent nose. Eyes are inclined to be starey and pupils large. Blood pressure is usually high, but temperature and pulse may be above or below normal. There is a precocious puberty in this type in both boys and girls.

While the hyper-adrenal type is much to be wished for in many respects, if the adrenal glands are over-acting to the discomfort of other glands one may suffer from sudden attacks of indigestion, chills with muscular spasm, constipation and lung diseases, with occasional tendency to nausea and vomiting. Women have irregular menses and as they approach the climacteric they get very fat but later become thin, weak and asthenic, with intestinal trouble.

Taking it all in all, the hyper-adrenal type is aggressive, pugnacious, combative. They are real fighters. Active, energetic, progressive, dynamic and soundly optimistic with a whole world of initiative. They exhibit an intense personality, yet are easily excited and are often choleric.

Hyper-adrenal adolescent girls have mannish tastes, are sporty, courageous and aggressive toward their companions. Women who become hyper-adrenal often change over from a quiet and retiring personality, to one that is thoroughly masculinoid—active, self assertive, with an aggressive manner. They are the type that enter politics, lead big movements and will some day be President of the United States. It is only fair to say that the hyper-adrenal condition in women is coincident with a sub-ovarian condition, as a rule.

THE PITUITARY

Situated at the base of the brain, below the roof of the nose, lies a tiny double-lobed gland known as the pituitary. It is protected by nature with bony safeguards of the skull like wealth in a bank vault. The secretions of the anterior lobe control the growth of the bones and tendons of the body, while the secretion of the posterior lobe regulates the tone of the nerve cells, the involuntary muscles, the brain and sex organs as well as facilitating continued effort.

This gland has a wide range of functions to perform, some of its blessings being good blood pressure, healthy sex tone, initiative, zest for study, work and travel, sustained interest in occupation and the endurance of youth. In this gland lies the splendid mental powers of many elderly people. The many conspicuous examples of business men, military strategists, statesmen, artists, and men of letters, who have retained their brilliant faculties and capacities for achievement in undiminished lustre up to the very end of a long career, must be credited largely to a finely tuned pituitary. The pituitary gland is responsible for the transformation, expenditure and conversion of energy into healthful, youthful vitality.

HOW TO DIAGNOSE THE HYPO-PITUITARY TYPE

It is evident that when the pituitary gland goes back on us we are in for considerable trouble. There is generally a backward mentality with low learning capacity. We are mentally slow, sluggish, apathetic, or deficient. There is an inability to maintain effort. While placid and gentle as a rule one is easily discouraged, loses self-control quickly and cries readily. Mental defectiveness with obsessions

and compulsions as well as sex aberrations arise as the result of a lowered pituitary function. In this condition we find the cause to a large extent of much juvenile delinquency. Children lie and steal, are incorrigible and pathological liars. They are backward at school, cowardly, easily dismayed at problems and often unmoral. They represent the type that are second and third offenders in the juvenile courts.

Usually those who are under five feet are of this sub-pituitary type. There is a general sluggishness of the body. Here we find that peculiar type of obesity that so many women have—a girdle of fat around the lower abdomen and fat right down the lower limbs. Muscles as a rule are weak, bony structure is small, hands are small and plump with fleshy tapering fingers. Corpulency is a general trend—not only in the fat boy who eats and sleeps well and is very phlegmatic, but women with a lowered pituitary are apt to get fat and dumpy past forty or forty-five. Boys have a general feminine contour and girls a somewhat masculine appearance. In the pre-adolescent period there is often a retarded skeleton growth, small gonads, dwarfism and only mild secondary sex characteristics.

There is a scanty growth of hair, men often having little or no hair on the face, pubis or arm-pits. If any pubic hair it is apt to be feminine in distribution in the male and a male distribution in the female. The sub-pituitary, is to a large extent responsible (with or without adrenal involvement) for the moustaches and beards in women. The skin is usually dry, flabby and smooth in adults and in children often shows whitish areas, is soft and smooth, usually sallow and pale or dusky.

Teeth are malformed, crowded and irregularly

spaced. The face is rounded with a full-moon effect. The head is small, the chin receding and the nose flat and spreading.

Blood pressure is usually below normal with low temperature and pulse. There is a decreased libido, frigidity and general low, sex activity. Fatigability, eye-strain and dim vision are common in this type. A lowered pituitary is the cause of diabetes insipidus, infantilism, and impotence in adults. Here we can find the cause frequently of kleptomania, epilepsy, mongolism and homosexuality. The woman with the dull, heavy, tired feeling and general depression with headache each month has a lowered pituitary function.

HOW TO DIAGNOSE THE HYPER-PITUITARY TYPE

When we come to those with too much pituitary activity, the hyper-type, we see a different picture entirely. There is great mental activity, initiative and memory. They are speculative, irascible, imperious, domineering. Here we find the thinkers and creators, the brainy, sagacious, self-willed, witty and keen, perspicacious, mathematical, logical and rational. This condition gives us the star pupils, the precocious children, the infant prodigies. Yet men of this type are often readily henpecked and irritable. Men and women have hallucinations, delusions, hysteria, depressive fears and fancies, are suspicious, highly imaginative with vague anxieties. Children are often aggressive, pugnacious, self-contained and calculating. When *enceinte* women have a changed, more mature and steadier outlook on life and are even somewhat masculinized. Menopause

often brings about hysteria or an aggressive masculine attitude. Women with a good pituitary are fond of children, men have high grade brains and ability to learn and control.

Men of this type are usually tall, well-developed and have a strong frame. This is the ideal, virile type—strong, muscular and with a tendency toward a bony frame. Hands and feet are large with prominent elbows. The knees and knuckle joints of the hands and feet are prominent. All people over six feet have as a rule a strong pituitary. This type is long and lean and do not get fat irrespective of their diet. In this they resemble the hyper-thyroid type. Women are generally slight and delicate, but often get fat after menopause. Children are usually large, spare with bony frame and large hands and feet although adolescent girls tend to be short. In some instances a hyper-pituitary may result in the short, rounded-out stout man instead of the tall, lean and lanky person.

We can tell this type easily by the hair. Usually very hairy on the arms, hands and legs. Women have luxurious eyebrows, while men have thick, bushy eyebrows that often meet over the bridge of the nose.

Hair grows low on the forehead and often it is thick in the nostrils. At times some men will have considerable hair on the face and head but little elsewhere. Hair as a rule is straight.

Skin is moist and soft with roseate or creamy complexion. Women often have a Dresden china doll face. They flush readily. This is true particularly of adolescent girls. In men the skin is apt to be thick, harsh, oily and at times puffy and ruddy.

The teeth are a good index. They are large,

broad, square and irregular. The middle incisors are very prominent. Women's teeth are very long generally and in both men and women the teeth will either crowd close or be well separated.

Men have a large head, often somewhat flattened on both sides. The forehead is high, the face massive, long and narrow and more or less oval. There is a large heavy, firm, square, protruding jaw and chin. Cheekbones are prominent as well as the nose, which is long and broadish or thin and straight. Eyes are large and prominent, often sunken but distinctly large, and while they are usually wide apart, they may be very close together. Ears are large and prominent and the lips are large.

Blood pressure and temperature are apt to be high all the time. In this type we find the cases of precocious puberty and frequent sex difficulties. The hyper-pituitary suffers more than others from severe headaches and are liable to certain diseases such as infantile paralysis, typhoid, scarlet fever, etc.

THE GONADS (SEX GLANDS)

The gonads (ovaries and testes) have been regarded merely as glands of external secretion until the internal secretions of these glands were discovered to be a dominating factor in the human body. While the external secretions are concerned with the process of reproduction, the internal secretions are of transcending importance. The internal secretions or hormones are produced in the interstitial cells (cells of Leydig) in the testes and in the Graafian follicles and Lutein cells in the ovaries.

The gonads have a tremendous effect on all living organism. In the human being they control sex instincts

and sex life, are responsible for passion and jealousy, are the source of the many secondary sex characteristics which have more to do with the personality of the individual than any other single factors. They are the barometer of the general tone of the whole endocrine system and exercise an effect upon every phase of life in an intricate and wonderful manner. With the rise and fall of the gonads other endocrines go through strange cycles of behavior. The brain, together with its intelligence, fluctuates in a remarkable manner with the rise or fall of these glands.

Complete elimination of these glands before puberty destroys all secondary sex character. In males a childish appearance remains; scant hair only appears on face and body; muscular strength never develops, but obesity and mental sluggishness are evident. With the female, the typical feminine pelvis never spreads out, the breasts remain small, hair appears on the face, the voice is harsh or low-pitched, the legs grow longer, and mentality is blunted and dull. With such infantilism there is no development of the adult mental attitude, nor does such unfortunate ever possess the reactions known to normal life.

The good strong gonad type has large thick bones. Small irregular upper teeth, turned, stumpy or missing lateral incisors. They represent the virile personalities you meet everywhere.

The sub-gonads on the other hand are objects of pity. In males there is very little, if any, hair on face or body, voice high pitched, muscles are weak, often obese and mentally sluggish. In women, the bust is small, hair on face, husky low pitched voice, long legs and stupid.

Both are infantile in many ways—light hearted, timid, cry or laugh readily. A man may have waist like a woman, his Adam's apple is not prominent. He is often tall and slender or undersized with flabby soft muscles. His hands and feet are small and shapely.

THE THYMUS

The thymus gland is located in the chest over the heart and straddles the windpipe. It is known as the gland of childhood because it appears to serve the purpose of holding back a bit on growth to prevent too early maturity.

While this gland should normally undergo a diminution at puberty we find it functioning to a greater or less degree throughout life. This thymic presistence goes hand in hand with excessive lymphoid tissue. Thus, given an enlarged or active thymus, after puberty and we find an increased production of lymphoid tissue at the expense of the highly differentiated tissue.

HOW TO DIAGNOSE THE PERSISTENT THYMUS TYPE

As a result of a persistent thymus, not counterbalanced by other endocrines, a wide variation from normal both in physical appearances and mental reactions can be observed. Inability to resist disease, stimuli or fatigue, sluggishness of thought, decrease of mental energy, absence of initiative, inability to concentrate—in fact, a general mental underdevelopment with all its ramifications, including serious mental aberrations—these are but a few of the outstanding evidences that are met with in the clinic. The self-centered, easy-go-lucky, irresponsible, weak, childish and peevish types come within this scope. Those who are more or less unfitted for the active struggle of life, look readily for protection and care and are often the cats-paw for others, show very evident signs of persistent thymus. The same holds true for many who seem alert of mind yet are simple in mental processes, frequently of an

obstinate and negativistic leaning. Where we find the thymus enlarged, we frequently find the passive or submissive pervert, the dishonest and the degenerate.

In distinct hyper-thymus cases we notice that the patient is a little taller than the average. While not as a rule obese, they often show great corpulency. Muscles are heavy and well rounded, but weak, while the hands are fleshy and plump. Men have slender graceful bodies with long chests while women have narrow waists and poorly developed breasts. There is a general absence of hair. If any, the texture is soft. Men often have no moustache or beard and the pubic hair is feminine in distribution. Teeth often lack uniformity in size and development, are pearl-like, translucent, and scalloped or crescentic at grinding edge. Central incisors are larger than usual while lateral incisors may be small, undeveloped or missing.

THE PINEAL

This cone shaped little gland is located in the head behind and above the pituitary. The *pineal* is most active in childhood. Some strange sex characteristics are prevalent when it fails to function properly, but its influence is not great after puberty. The pineal should not calcify before the thirtieth year. The pineal also has a direct relationship upon sex development in warm countries where intense light causes early pineal atrophy and earlier puberty is invariably the rule. Continued pineal activity holds in abeyance proper pituitary and hence mental development.

If the pineal persists after puberty there is a diminished sex expression. If it atrophies very early there is a precocious hair growth in children and very early sex development, but with great muscular weakness.

It was once regarded as the seat of the human soul

Now science believes that it plays an important function in controlling the development of the reproductive organs. Experiments on animals have shown that its destruction results in premature development, together with excessive bodily growth. Among humans there have been cases where maturity has come in early childhood, as the result of the loss of the pineal gland through tuberculosis.

PANCREAS

This gland, known as the sweetbreads, is located near the solar plexus in the abdomen. It secretes the well known pancreatic juice to aid in digestion, but it also secretes a special hormone called insulin. The function of this hormone is to handle the oxidation of sugar. When this gland does not secrete enough hormones the sugar and starch we eat is not burned up to yield energy, and there is an excess of sugar in the blood or urine. This condition is known as diabetes, from which thousands die yearly.

PARATHYROIDS

These glands are located in and around the thyroid. They control lime metabolism as well as influencing the excitability of nerve and muscle. There are four of them in all and each about as large as a grain of wheat.

When they are not functioning properly, the person is nervous, restless, over-excitable with a loss of nervous equilibrium. Handwriting is tremulous and one is unable to sleep or sit still. The bones become soft and weak, while the nails become brittle. The hair falls out readily. Children's teeth decay rapidly and there is a general improper development in adults. In serious sub functioning the disease known as tetany develops—unsteady muscles and nerves and a general wasting away.

SPLEEN

The spleen is a large organ and seems to possess less variety of duties than some other glands possess. It is concerned largely with blood production and exercises a tremendous influence in rendering the blood capable of combatting toxins. It keeps our bodies immune from germ disease. Chronic malaria and other germ diseases are quickly erased when the spleen is made to secrete its full measure of hormones. Dr. Pais, working under the supervision of the Italian Government, radiated the spleen in 5000 cases of malaria and produced 5000 cures.

There are evidently internal secretions from other organs such as the kidneys, liver, etc., but not enough is known about them to-day to give any accurate description of their function.

So it is evident from the above that upon this chain of little glands every physical or mental characteristic and every mark of our distinctive appearance finds its foundation. The eye, the ear, the forehead, the nose, the mouth, the neck, length of arms and legs and torso, hair distribution, skin coloration and a thousand other indications not only tell us the inside story, but they are the outward expression of this inward foundation of our physical character and life.

CHAPTER III

AN INTERLOCKING DIRECTORATE

HOW THE ENDOCRINE GLANDS ARE RELATED TO EACH OTHER

In the evolution of our modern knowledge on the subject of the endocrine glands, a process which has been under way for nearly half a century but which has assumed its revolutionizing character in the last two decades, it was discovered that no one of them performs its function independent of the rest. Nature has a habit of compensating for shortcomings. By way of simple illustration, in surgical cases where the stomach is removed the intestine undertakes the digestive function. As has been noted by everyone, where an arm is amputated in childhood the other arm develops an unusual size and facility, for the purpose of performing the work of two. This law is evident throughout all organic life, so it is not strange that the endocrine glands, each with more or less specific work to do, should be in a manner dependent on the co-operation of others. Each stands ready to attempt to the best of its capacity the work of a backward member. So it happens that the endocrines, although entirely separate from each other and remotely located in the body from one another, have a definite reflex upon each other, a sort of interlocking directorate, with each member feeling himself responsible for the other fellow's success or failure.

The individual members of this glandular system, while intimately related, are dependent solely upon the interchange of their specific secretion of hormones, accomplished by the aid of the blood stream. This interpendence tends to keep the body as a whole in a con-

dition of chemical and functional equilibrium. The atrophy or diminution of secretion of one has a distinctly deleterious effect upon others, for it causes them to undertake work for which they are not suited, and in their over-secretion, called hyper-condition, they bring about some of the strangest of physical abnormalities.

To illustrate only a few of the very general relationships, thousands of which are now definitely charted, the thymus is antagonistic to the adrenals; the thyroid to the thymus; the thymus and the pineal hold the gonads in check, while an over-active thyroid, pituitary or adrenal may cause atrophy of ovaries or adrenals. Low adrenals usually produce hyper-thymus, and over-thyroid usually results in enlarged pituitary, while the reverse of the process does not necessarily take place.

Where one gland is injured or for any other reason furnishes an insufficiency of secretion, the result is almost certainly an over-activity on some complimentary gland, not always the same under apparently similar conditions, but following certain well-understood relationships there appear those strange and heretofore misunderstood combinations which we call type or character such as slenderness, obesity, mental brilliance or sluggishness, enlarged or diminished interest in life, nobility or despondency, philanthropy or miserliness, generosity or niggardliness, lovableness or aloofness.

The pituitary often over-acts when the thyroid is under-acting. When the thyroid decreases in function the sex glands also decrease even to the point of impotency. Increased thyroid often stimulates the adrenals to action. With increased or decreased thymus the thyroid also increases or decreases. Increased thyroid seems to decrease pancreas action.

An increase of pituitary action may increase thyroid activity. The sex glands have their activity lowered when the pituitary function decreases. With decreased pituitary action the pancreas increases its activity.

The pancreas inhibits the action of the thyroid and adrenals. The adrenals stimulate the thyroid but in-

hibit the pancreas. The thyroid inhibits the pancreas and stimulates the adrenals.

Increased adrenal increases the activity of the ovaries and testes, but reduces the action of the pancreas. An over-active thymus retards the sex glands, while reduced sex glands (as in castration) causes the thymus to enlarge. Reduced sex gland activity also causes increased pituitary action.

These are only a few instances of the relationship of the various glands to each other. In this connection permit me to quote from a famous authority. Dercum states:

> "There is, however, one functional relationship which should be stressed and which is observed in the female. It is the relation between the function of the ovary and the thyroid gland. The thyroid enlarges in the female at puberty; it enlarges also upon marriage and again upon pregnancy. Further, the involution of the ovary at the time of menopause has a depressing effect upon the thyroid and possibly upon the pituitary; many women grow stout at this period.
>
> When we compare the findings in the eunuchs and eunuchoids, we learn that these findings are due entirely to the loss of the internal secretion of the testicle. The loss of the germinal portion of the gland seems to be without any effect on the organism. Perhaps this is what might be expected, for the product of this germinal portion is an excretion, something to be thrown off.
>
> As regards thymic relations to other glands, we are impressed by the frequent finding of an enlarged thymus together with the lymphatic hyperplasia in exophthalmic goitre. According to Klose, there is no Graves' disease without thymus enlargement. If so, the thymus is

probably playing a rôle along with the thyroid in the production of the symptoms. It is interesting to add in this connection that in the opposite condition, that of marked deficiency or failure of development of the thyroid gland, Pineles found in very young individuals a marked deficiency of thymus development."

CHAPTER IV

SIGNS OF ENDOCRINE DEFECTS

THE signs of endocrine defect are so numerous as to be beyond listing here. But to the thousands who are suffering with ailments of long standing or with mental or physical deficiencies which they so clearly recognize as lessening their capacity for usefulness, their own condition should be the clearest evidence of their problem.

In Childhood or Youth:

Mental defectiveness evidenced by inability to keep up with normal school classes, or even more serious defects which the doctor pronounces as definite defectiveness; inability to play or read or talk as normal children do, are outstanding features. Poor eyes, poor ability to concentrate or remember, unsound sleep, anemic condition, tendency to acquire all manner of germ diseases, extreme shyness or cowardliness are noticeable in such children.

Adolescence:

The adolescent period is the critical moment in life when the organism re-adjusts itself from the job of growth to the job of reproduction. It is the most important climacteric in human life. At this period the evidences of endocrine defect are primarily noticed in the following: Failure in the girl to develop the procreating functions. Failure in the boy to acquire the secondary sex characteristics of deep voice, hair on face, pugnaciousness, and the primary sex instincts. At this time some youngsters fail in mental application, show

a backwardness in studies or the necessity for concentration to any task, not noticeable before. Some develop a tendency to a nervous constitution, while others slip into that very critical condition called dementia praecox. Both girls and boys become delinquent and lose all moral balance. These are signs of endocrine dysfunction or misproportion of the adolescent period.

Early Manhood or Womanhood:

Women frequently fail to develop the normal sex inclinations, showing signs of deferred adolescence expressed in a nervous coldness of demeanor very commonly met with in the slender over-pituitary types. With women menstrual troubles become acute. With men signs of failing sexual powers are noticeable. Highly nervous types evolve and anemia, arthritis, impotence and nervous, excitable, erratic, irresponsible types result. These develop into all forms of extreme abnormalities. They fill the asylums, penitentiaries and the sanitariums. In minor forms they give *wanderlust*, lack of responsibility and frequently a disregard for man, law or God.

Middle Age:

Less violent misproportions of endocrine function at this age frequently develop rapidly into serious faults. They give rise to that whole trend of ailments so common to those of middle life. They are more responsible for the early death of the race than all other causes known to man, including disease and pestilence. They are responsible for the so-called "run down condition" which makes life tedious, boresome, uninteresting and usually unsuccessful. They bring in their train diabetes, tuberculosis, cancer, hardening of the arteries, high or low blood pressure, abnormal metabolic rate, impotence and early senescence. The more extreme cases never reach old age, and death is frequently preferable to an unhappy old age which certainly lies in store for those who have passed through a middle age weighed

down by endocrine faults of constantly accumulating proportions.

Old Age:

Old age is what is left after these endocrine faults and failures have charged their toll. To those with more serious difficulties in earlier years, old age is not a problem for they have since found rest in the cemetery. Any man or woman who has reached three score and more has been fortunate enough to be endowed by nature and blessed by environment beyond the average lot. This endowment is primarily endocrines of sufficient normality in childhood and sufficient balanced activity through middle life to make old age a happy or an unhappy heritage in exact proportion to the relative activity of the endocrines.

Change of life in women has now passed. In men, however, impotence is far from being a necessary result. Even change of life in women is only a reflex of a too early wasting away of the endocrines, especially the gonads, or life would continue its middle age phase to an extent not even suspected. Old age is seldom free from the pains and aches, from the indigestion, constipation, rheumatism, the marks of failing memory or senile decay commonly considered the necessary concomitants of age.

The simplest goal the endocrinologist sets for himself to-day is that of bringing all men and women, through a proper balancing of their endocrines throughout their lives, to at least the century mark. It is also believed that while all old people may not necessarily, by any means science now possesses, be carried beyond this century mark with the full mental and physical powers of youth, it seems certain that such can be the case with those who have not lived through long periods of endocrine failure leading to complete atrophy of these necessary organs, results of which may be only partially relieved but not eradicated. When the scientist with new found means of control of the endocrines can have

the individual in hand from childhood and early youth through to old age, then it is confidently expected by those now mastering this new found means of endocrine control that every man and woman rightfully normal at birth may be made to possess the full active energies of vital manhood and womanhood at least to five score years.

These are the signs of endocrine defect in brief. They have a thousand manifestations and they are based upon the absolutely numberless combinations of endocrine proportions which make every individual different from every other.

In "Biology of Internal Secretions" we read the following very interesting description of various signs of endocrine defect:

> "The word 'normal', of course, expresses only an average of qualities which allows of some though not a large degree of variation. Wide departures, especially in the human organism, are so striking as to permit of no misinterpretation. Again, these departures are of two kinds; first, those which are general and clearly involve the organism as a whole, and others which appear to be local and relatively unimportant, such as the anomalies not infrequently found in the dissecting room; yet even these are not without a general significance.
>
> Among the evidences of abnormality and subnormality in the human subject—among the evidences of aberrant, incomplete, or imperfect development—many present themselves to direct observation. Thus, inspection may reveal a trunk which does not present the normal contour of the adult or youth, but which is distinctly infantile in type; it is cylindroid in shape; the normal expansion in breadth at the shoulders and pelvis may be absent; even

the lumbar flexure may be absent or very slightly marked. The scapulæ may be unusually winged; or perhaps the spine of the first thoracic vertebra is unusually prominent. Again, the extremities may show an excessive length or the normal proportion of length between the upper and lower extremities may be departed from, so that the arms are relatively too long and the legs too short. There may also be abnormalities in the relative lengths of the digits, of the phalanges, and of the shapes of the hands or feet; this may be noted in the middle and ring fingers, or in the thumb, or in the little finger when the hand and digits are extended, may be slightly overextended in the proximal phalanx and flexed in the middle and distal phalanges. Sometimes there is—and this is much more common—a tendency to flat-foot.

When we turn our attention to the head, we may note on opening the mouth a high, a narrow, or perhaps an irregular hard palate, due apparently to the failure of the frontonasal process of the embryo to descend to its usual level. We may note also an irregular conformation and abnormal position of the teeth; the latter may be unusually small, suggesting the teeth of childhood, and are often widely separated. They may also reveal striking morphological peculiarities, e.g. rather large canines, canine interspaces, or crowns that are much and prematurely worn.

When we look at the ears we not infrequently observe that the lobe is small or imperfectly formed or that it is confluent with the cheek; that the concha is flaring and projecting from the side of the head; perhaps we note also the concha is pointed or that the Darwinian tubercle is unusually pronounced; perhaps other

irregularities are observed, for instance, that the external meatus is unduly narrow.

When we examine the skull we may find that it is unusually small or unusually large; that the forehead is unusually prominent and high or that it is unduly receding. We may note again that the vault of the skull is unusually pronounced or even pointed (oxycephalic), or that it is too low or even saddle shaped (clino-cephalic), or that the occipital region is flattened, or that the parietal regions partake of this peculiarity. Perhaps we will observe that the face is too small in comparision with the size of the cranium; or, on the other hand that the face is disproportionately large and the cranium too small; perhaps the lower jaw is too short and the chin receding, or too large and projecting, so that prognathism results.

It may be that in looking at the eyes we find that the space between them is unusually small, the globes seem to be too close to each other; or, on the other hand, they may seem too far apart. In examining the pupils, also, we may observe that they are somewhat unequal and that this inequality is morphological; or that they are not well rounded, perhaps plainly elliptical; or it may be that they are not exactly in the middle of the iris, but are eccentrically placed. Occasionally, too, we may note the presence of a fold of membrane over the inner angle of the eye.

In looking at the body as a whole we may observe that the musculature is poorly, or, it may be, unduly developed; or perhaps that the deposit of fat beneath the integument is excessive or unusual in its distribution, or, perhaps, that it is strikingly deficient. Unusual pigmentations, nevi, angiomata may be noted; or,

the skin may be unusually dry, may seem thickened and course, perhaps scaly; on the other hand, it may be unduly moist or changed in hue; perhaps livid, especially in the distal portions of the extremities. At times the surface of the body generally is darkened, especially under the flexures of the limbs and in the groins and axillæ. At times, again, the surface of the body is unduly hirsute; hair, often coarse and dense in quality, is noted upon the limbs, the chest, the back, and even over the abdomen.

Interesting observations may also be made as to the genital development and the secondary sexual characters. We may note, for instance, in men, that the genitalia are small, perhaps decidedly undeveloped; that the hair of the pubis is very sparse or that it is abnormally distributed, i.e. is of the feminine type, and instead of being prolonged in triangular extension upward, ceases abruptly and transversely. Together with this there is usually an absence or feeble development of hair upon the trunk or extremities; the skin is unduly smooth and resembles that of the female; the beard and moustache are likewise either feebly developed or absent; the larynx and voice are feminine in character; the voice smooth, soft and rather high in pitch. In keeping with these findings there is commonly a fulness of the breast, buttocks, and extremities suggesting the feminine contour. The pelvis also is likely to be broad and of the feminine type. Sometimes such features are associated with knock-knee and with retroflexion at the elbow.

In women the pubic hair may have the distribution typical of the male, and together with this there is frequently a tendency—at times marked—to the growth of a moustache

and beard. The pelvis is narrow and the shoulders broad, suggesting those of the male. The musculature, too, is masculine in type; this is especially noticeable in the development of the upper extremities. The mammae are small and commonly flattened; the nipples are poorly developed; at times supernumerary nipples are noted. The external genitalia are frequently small, sometimes infantile in appearance. A cleft vagina may be present."

CHAPTER V

HOW THE ENDOCRINE GLANDS AFFECT OUR MENTAL PROCESSES

EVERY single process of the mind, conscious and unconscious, emotional and intellectual are influenced by the chemistry activities arising from the secretions of the endocrine glands. Without the influences of these secretions we would have no mind at all. We would still have a brain, it is true, but the brain would not function. Take only the thyroid secretion away and the person becomes an imbecile, a cretinic idiot.

The nerves down to the tiniest cells must receive the magic chemistry mixtures from the glands or there is no feeling. Test upon test has been made to ascertain the amount of the secretions of both the adrenals and thyroid that determine the speed of thought in the brain. This is measured by the electric conductivity of the brain. With a sub-thyroid or adrenals the nerve impulses travel or flow rather slowly, whereas when the glands are activated the secretions of these glands are increased, more go into the blood stream and to the brain cells, with the result the nerve impulses are speeded up remarkably and there is a pronounced increase of sensations and ideas. Just as when we are in a dangerous situation thoughts fly through the brain with greater rapidity, we become super-alert and keyed to the highest pitch of keenness—all because danger just as any unusual emotion or sensation is able to influence the adrenals and thyroid to speed up their activities.

Thus as the brain is absolutely dependent upon the chemistry of the endocrines it is evident that every

attribute of the brain as a functioning mechanism—thought, memory, perception, conception, emotions, etc.—depend absolutely upon the way the endocrines behave in the particular individual.

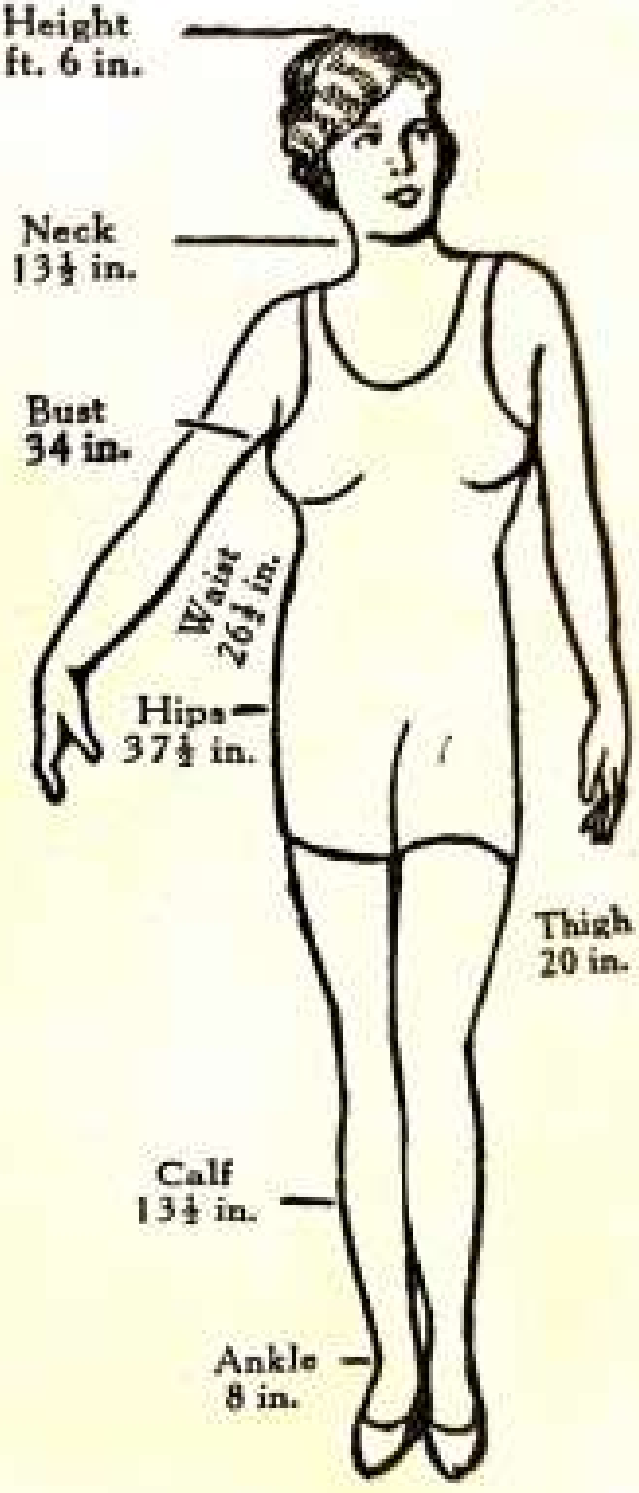
As I have said, the mind is simply the result of the chemistry processes governed by the endocrine secretions in the brain cells. The conscious and the subconscious alike are chemistry products just as is odor, heat, cold—things that cannot be seen either. Mind you I make no mention of the soul. I prefer no discussions on this subject as I know nothing concerning it. But all that we know about products of the brain or the mind, as you will, these we know are the results of the action of chemical hormones.

Thus in discussing the brain and its diverse activities of every and all kind, including all that the mind is capable of producing, we are on physical grounds. There isn't a single thing psychic about it excepting as the psychic is the result of hormone activities. Whatever the endocrine condition of a person may be so will be his mind and brain and will in every minute respect. A man both mentally and physically is exactly what his endocrines make him. Each person has a different endocrine make up and thus no two are alike. Even though two people did start off at birth with identically the same endocrine combination they could not remain alike for ten seconds because every sensation, stimulus or impression influences these glands. Environment, which includes everything practically from the kind of food eaten to the kind of occupation, keeps up the supply of varying stimuli or sensations that make changes in the endocrines. These in time change his brain and vegetative apparatus. So dispositions change for better or for worse.

A peculiar feature of this is that the basic endocrine make-up of a man may be handed down to his children, but the probabilities are that he may hand down through the germ plasm his changed endocrine combination. There is no proof to-day that the particular endocrine

WHAT IS NORMAL?

The previous chapter gave data regarding different variations from normal, due to imperfect endocrine gland action. The picture below gives approximate measurements of a woman with well-balanced endocrine glands. There are endocrine types that will vary from these measurements and still be normal, with perfect endocrine glands, but this chart shows what may be considered as one practically perfect type.



combination we are supplied with is so basic that it cannot be so altered in the course of time that the family characteristics or even racial tendencies cannot be obliterated. Many children of large families are so totally dissimilar that they would not be taken for relatives. Furthermore, the environment of America in two generations is changing the racial appearance of certain people who seldom marry outside their own people. It may, therefore, be regarded as a fact that the endocrine make-up of an individual can be so changed that this improvement will be passed on through the germ-plasm.

The different attitude of men and women are not due to the sex glands alone. The male is aggressive because he has a great deal of adrenal mixed into his gonad hormones. The female is receptive and demure because her mixture is pituitary and gonad.

The real sex expressions do not appear as a rule until puberty. Then their mental reactions to the newly awakened sex changes appear. If the sex change has been perfect we get proper size breasts, free menstruation, and everything physical that constitutes a true feminine, As a result her mental reactions will be feminine. Where the sex change is not a success the physical appearance is not truly feminine—there is a coarseness, small breasts, faulty menstruation and general masculinoid appearance. Her mental reactions, her psychic, is then in accordance with her physical condition. She is everything but feminine. Women are thus mentally the result of their ovaries. Men likewise to some extent are what their sex glands are.

We now begin to get some little insight into instinct and behavior. We see how thoroughly dominating over all is the sex influence. We know it has all a physical basis.

When a specific sensation or stimulus reaches the brain cells this is passed on to the endocrines. Depending upon the kind of stimulus thus transmitted, there is either an increase in the secretions or a partial inhibition. This results in a change in the amount of hormones

in the blood and this in turn causes various types of changes in the vegetative system. In other words, the nerves, muscles, blood vessels and viscera are variously affected by tensions or relaxations, movements or inhibitions, tumescences or detumescences. Whatever this change may be it is sent to the brain, which in turn has been vivified or depressed by the hormones. All this chemistry process enters into instinct. Thus instinct as well as any mental process is the result of the physical sensations in the vegetative system set up by the endocrines.

If the brain carries out the instinct then the tension is relaxed in the vegetative system and it goes back to normal. This is the manner of operation of the sex instinct and the result depends entirely upon the sex hormones that are released as a result of the stimulus.

All psychic processes are instigated by a craving, need or desire. These forms of the wish originate within the body but not within the brain. As I have previously said, the brain is primarily a storehouse and transfer station. It does not and cannot produce a single wish.

All wishes arise within the vegetative system—the complex of viscera in the abdomen and chest, blood and its vessels, endocrines, muscles and nerves. These are masters of the brain. In them alone can wishes start—never in the brain.

The vegetative combination is a changing flux and the brain gets it all. The chemistry is changing constantly because the endocrine chemistry is always on the go. The intra-visceral and intervisceral equilibrium and intra-muscular pressure and intermuscular equilibrium are all regulated by the endocrines and they all send their changes to the brain. This is the birth of the wish.

The sex desire outside of hunger is perhaps the strongest of all wishes sent to the brain. The eunuch has no wishes in this respect. We speak of a man or a woman with tremendous sex desire, yet many are as innocent of harboring their wishes as a new born babe. They use every ounce of effort to stem the tide, to fight

it off, but like Banquo's ghost it reappears to pester them. When sex glands are functioning normally, there is a wish born in the permutations and combinations of the chemistry changes that send determined messages to the brain. The purest soul in the world is bothered with these wishes and desires. What the brain does decides the whole story.

If they are suppressed they will break out in some other channel or so upset the whole chemistry that the brain is upset and a psychoneurosis results.

Of course, outside influences, stimuli, can set the endocrine and vegetative apparatus in action. These stimuli often repeated enable the vegetative apparatus to respond to them in a stated way. And in fact we get stimuli from associated stimuli. In other words if a certain stimulus or sensation has been producing a certain action on the endocrines another stimulus that is in some way associated with the original stimulus will produce the same effect.

So we can go down the line to stimuli or sensations that are only remotely associated, having the same effect on the glands. A woman thinks of her lost soldier boy whenever she sees another soldier, or even reads about anything at all associated with war. Psychology in many phases is now clearly explicable on this basis.

Our conduct is the result of the vegetative actions. Their actions are constantly changing. First a stimulus of one kind sets the wheels in motion resulting in a wish or desire, sent to the brain where the brain adopts a line of conduct which satisfies the pressure and thus lets it go again. Then another wish comes into play, dozens of them, and the chemistry changes that take place are as rapid as light waves and the greatest urgent wish of them all is what turns out—what the brain does—and this constitutes our conduct or will.

This whole operation depends on our endocrines. If there are two wishes or instincts utilizing two different endocrines the endocrines that are the strongest will win

out. So our conduct depends entirely on how we are hooked up in an endocrine way.

Just how the endocrines will respond to a stimulus depends on the character of the endocrines. It depends on how "healthy" the endocrine is—whether it has been injured by disease, accident or otherwise or what past influences have made their mark on the glands. We must also remember that one endocrine can inhibit another and in this unseen action we can look for much that has been described as the unconscious.

Of course the whole vegetative apparatus gets acclimated, as it were, to certain stimuli or sensations—call it environment if you will—and thus the vegetative apparatus will respond in the way the endocrines dictate. Thus behavior is the result of the chemical hook-up of a person—functions in accord with the type of endocrine factors that are the most dominant.

We have always regarded courage to be something that a person possesses as a mental trait. The same thing applies to fear and anger, yet we know they have their seat in the same organs and tissues as all other forms of mental expression. Whether a person is fearful or gets angered readily hasn't the slightest thing to do with it. The instincts of fear and anger were worked into the cell structure before we even had brains back in the unicell days of evolution.

To-day we can trace both fear and anger—two opposing instincts or mental reactions—to the adrenal gland. The adrenal medulla makes the chemistry mixture that results in fear. The cortex is the instigator of the anger expression.

Only a short while ago we thought that the exophthalmic goitre look of fear in the eye was due always to the thyroid. We now know that unless there is a true goitre present this look of fear is caused by an over secretion of the adrenal medulla. We know that when we inject the secretion of the medulla the effect on the vegetative viscera and muscles is to produce high blood pressure, paleness, quick gasping breaths, twitching of lips and

limbs, hair erection and general trembling combined with a sort of stare—all earmarks of fear. This particular type of organic disturbance gives to the mind the emotion known as fear. It also unconsciously releases the extensor muscles (those of attack) and tenses the flexor muscles (those of flight).

Now if the cortex secretes enough or more to overcome the medulla then the whole organic disturbance is the reverse of fear—that of fright or anger. Now if we give plenty of thyroid to the medulla we get terror. If we give plenty of thyroid to the cortex we get fury.

I have described how some people get frightened so readily while some are not. Now we know where the answer lies. It depends on whether their medulla or cortex predominates. This statement needs explanation. Fear may be found in those who have more cortex because there was a time when the reverse was true in these people and the impressions are still existant in the organism. This is in line with associated memories spoken of which go directly to the medulla and makes the person not only fearful but absolutely panic stricken, yet ordinarily the person has a good cortex and is never afraid.

If a woman has too much cortex she is masculinoid. A normal woman should have more medulla. The corpus luteum stimulates the medulla. So does the post pituitary. Thus there is a combination to keep women in the fearful column.

Anger comes from the cortex. Courage and anger go together. The courage of the tiger is a sort of anger that rushes blindly without thought into fights, etc. It is typically a cortex influence. The courage of a man takes us beyond instinct, because it is thoughtful courage. Therefore, in order to make this effective there must be a good ante pituitary. As a matter of fact the ante pituitary is the real dictator of thoughtful courage although it must work with a good adrenal cortex. Another point that must not be overlooked is that in order for the ante pituitary to function properly one must have

good gonads. Unless the gonads are good no courage is possible—in fact cowardice is the result. This means that even with good cortex and ante pituitary a man would still be cowardly if the gonads were off. Yet it is also possible that if the gonads are not up to the mark one cannot have good cortex and anterior pituitary.

The great basal ganglia, the bundles of nerve cells and fibres situated at the base of the brain, are the centers of emotional control as well as co-ordination. This ganglia is bathed copiously with the secretions of the post pituitary gland. Thus sympathy, tenderness or tender heartedness, suggestibility and the other so-called basic sentiments are influenced by the post pituitary secretions. In response to stimuli the amount of post pituitary in the blood determines the type of emotions—plenty of it means plenty of tender emotions. It is natural, therefore, that the most fundamental of all emotions—the maternal instinct—should be under the sway of this gland.

The ante pituitary secretions account for a large measure of the sheer intellectuality of people. We know that when we increase the secretion of this gland we get good results in increasing intellectual activity and self-control in defectives and others. The external evidences that show good ante pituitary will usually be found in people of high intelligence. The curiosity instinct and the emotion of wonder which express themselves in constructive and acquisitive tendencies usually precede real intellectuality.

So on examination we find that the ante pituitary is very closely related physically to the frontal lobes of the brain, where abstract thinking is done. In fact all the higher thought has its seat in these lobes. Here arises the power of the mind to control its environment by abstract ideas, concepts, etc. Here we find intellectuality. Here the ante pituitary has great sway.

Thus when we find there is a disturbance in the two great instincts—intellectual and maternal—with all their complex ramifications throughout the normal and intel-

lectual spheres of the mind, we can find the cause very often in some disturbance of the pituitary gland.

Mankind has much to learn in a reconstruction of many of its codes of ethics and morals from a proper study of the pituitary gland. Much perversion, stupidity, mental dullness and defects of conduct and intelligence, loss of control, mental aberrations, etc., are absolutely helpless as far as conscious effort can change them, because they are governed by the fluctuations of chemistry changes within their pituitary, or the gland might be diseased or injured, or, as the X-ray shows to be quite common, the bony container is too small and the pituitary is cramped.

The dynamics of all the instincts can be traced to endocrine gland chemistry changes. We find the thyroid has its oar in many instincts of a vital nature and on this account is of the utmost importance. For example, when the thyroid does not secrete sufficiently there is always a certain sluggishness or mental depression. The self effacement instinct and the shame emotion stand out, melancholia easily results with all its attendant manifestations, the desire to be away from people for solitude, the desire to hide or to be away from crowds and even to make oneself believe one has done things that one has not. It is a type of mental aberration that is quite prominent.

In the case of those with too much thyroid secretion we find just the opposite tendencies. The instinct of self-display and the pride emotion come into play. We find boasting, lying and then mania follow in time. The term manic-despressive psychosis, which describes the person who is sometimes depressed and yet at other times a victim of mania can be translated to-day into thyroid-unstable. Now the thyroid under-secretes—now it over-secretes—the one resulting in depression, the other in mania. In people of this type we most often are apt to find egomania and megalomania. It is noted particularly that where there are attitudes toward the self it is usually in those of thyroid instability.

People with thyroid excess (hyper-thyroid) or a full 100% thyroid are extremely energetic. In fact it is the thyroid in people that makes them actors, doers, on the go all the time, live wires, continuous rapid fluent talkers. The amount of thyroid secretion they have determines the rapidity of their pace, because thyroid secretion accelerates the various activities and functions of the entire organism, thus increasing the rate of food consumption and heat production. Great geniuses have long been known to have great energy, therefore, the man with plenty of thyroid and hence plenty of energy has at least one essential for a genius.

The inactive, lazy, cumbersome, logy, silent person is sub-thyroid, has little energy. Furthermore, he is unable to discriminate readily, he is not responsive to either heat or cold readily. The man with plenty of thyroid on the other hand is extremely sensitive—in fact so much so that the slightest thing may irritate him. Yet this acuteness of perception helps his mental facilities marvellously—all because a little excess thyroid gives his organism a greater electrical conductivity.

As all brain activities are simply chemical reactions under the influence of stimuli or sensation so the one known as memory consists in chemical deposits of an unknown nature in the brain cells. When these deposits disappear then one forgets the things represented by them.

It has been noted that those who have a sub-thyroid have poor memories. There is no doubt that the thyroid has much to do with the chemistry arrangement that places a thing in the brain cells and also by increasing the electrical conductivity of the brain—easier conduction from cell to cell—thus makes it possible to remember at all.

It may also be noted that when the pituitary is affected there is a noticeable loss of memory for past events in particular. In sub-thyroid the loss of memory is for more recent events. This shows that the thyroid has to do with setting, placing, fixing, establishing the mem-

ories while the pituitary secretion must be able to preserve the chemistry mixture.

It is natural that a good thyroid, meaning good electrical conductivity of the brain, should result in quick thinking, which is one of the essentials in decision or judgment. The more thyroid the greater the velocity of action. The element of accuracy in coming to a decision, forming an opinion, or giving a judgment depends on the usable amount of ante pituitary secretion for the purpose. There is not much of this available till after adolescence is completed, because the requirements of physical growth during this period call peculiarly upon the ante pituitary. As mentioned above, the position of this gland with reference to the nerve cells of the frontal lobes of the brain shows its use in determining chemically the proper arrangement of knowledge, experience, problems, information, etc.

Mature judgment comes only with years, because of the physical conditions named above. Of course, age alone does not insure accurate judgment because in some folks the post pituitary keeps the upper hand and again other endocrine dysfunctioning will change matters.

Under no conditions can the ante pituitary function properly unless the gonads are working right, as the connection has been pointed out before. There can be no real intelligence, memory, judgement, etc., without good gonads.

You often hear it said that so and so is a fine chemist or engineer but he lacks imagination. The reason is that takes a somewhat different mental hook-up to apply logical, mathematical, scientific abstract reasoning than it does to use the imagination. They don't go together at all. A woman has greater imaginative properties than a man and less of the scientific attributes. Women are post pituitary centered when intellectual men are ante pituitary. The slight excess of the secretions of one or the other of these may mean all the difference in the world between lots of imagination or lots of scientific powers.

We now begin to realize something of certain mental conditions that have seemed so obscure in the past. We have mentioned the effect of too much thyroid relation to mania. The adrenal medulla also exerts an influence in inco-ordinate brain activity and mental restlessness. The post pituitary now enters upon the scene also in a very decided manner—in fact as the commanding figure. All mental aberrations linked up in any with imagination can be traced to an excess of post pituitary. These include the ordinary nervous conditions, delusions, suspicions, fears, anxiety neuroses, phobias, hallucinations, etc. Women are post pituitary. It as a well-known fact that during menstrual periods and pregnancy, when there is an excess of the post pituitary, imagination streaks bordering on psychoses are present in many. By imagination we do not mean the constructive theorizing of the genius, the man with a vision. We refer to the neurotic type in all its variations. The imagination we call vision no doubt comes from a thoroughly good pituitary—a perfect balance between post and ante pituitary.

I have spoken of the dominance in women of the post pituitary. Unless there are good ovaries or other endocrines to make up for a certain excess there is not only imagination run riot, but a certain hysteria or perhaps a mild type such as irritability which is noticeable in women just prior to and during the menstrual period. Under these conditions we can expect almost anything in the way of mental aberrations—from touchiness to suicide. Undoubtedly the loss of influence of the ovaries over the pituitary at menopause is one of the outstanding causes of the so-called menopause neurosis or psychosis—ranging from melancholia to mania. Most anything can be expected mentally when there is a glandular upset, for the dysfunctioning of one or more glands will be echoed in the form of mental upset.

There is a more general expression of the individual through the unconscious or subconscious than through the conscious. The little manifestations of our inner

selves that are so characteristic of each one of us personally are the results of the flow of endocrine secretion as regulating the surplus energy as an outcome of intravisceral pressure.

Shell shock is an outward reflection (in the form of an ailment or disease) of a disordered endocrine condition accentuated by unusual sensations. First, the patient must have a condition of glandular dysfunctioning, as good gland action could resist most kinds of impressions. In time, no doubt, any endocrine make-up would succumb to excessive stimulation or depression, but in the case of shell shock it is a rather prompt action comparatively because there was some endocrine imbalance, upsetting the vegetative system and thus echoing in the psyche. This physical loss of co-ordination due to a physical cause (sensation, stimulus, etc.) will result in physical as well as mental (which is really physical) conditions such as deafness, blindness, loss of speech, paralysis, etc. Probably the adrenal and thyroid are the most common offenders.

Do we think with our brain only? Is the mind, conscious and unconscious as well, limited to the brain neurosis? The latest conception is that every part of our body enters into the thinking process, but especially our viscera, muscles, vegetative nerves and endocrine glands as well as brain.

Naturally the endocrine system is the most important because every other part of the organism depends upon it. Therefore the prime instigator and fixer of consciousness and unconsciousness is this system, which is the only part of the anatomy that is different in all human beings at birth. From then on environment of all kinds modify his secretions as time goes on thus not only modifying his external characteristics but his very consciousness. As the stimuli from environment and in fact everything are purely physical it is evident that consciousness, unconsciousness or even subconsciousness are all physical results of chemistry changes by way of the endocrines and vegetative apparatus.

Man considered as a chemistry laboratory, an energy machine, a means of transforming food, oxygen and water into energy, has two main methods of communication between the viscera. First, the nerves and nerve cells which are in direct contact throughout the viscera. Thus whatever energy process may take place therein could be stimulated, accelerated or retarded within as the influences could be conducted by this means of communication. Second, the endocrine glands which send their chemical secretions (hormones or messengers) from viscus to viscus and nerve to nerve. This whole combination—viscera, viscual nerves and endocrines—make up the vegetative apparatus.

In the whole vegetative system there can be wide variations as to size, etc., except in the case of the endocrines where any slight variation of a certain amount makes quite a difference. In fact the whole story of the vegetative apparatus is told by the endocrine changes as their variations would determine the amount of tension or relaxation, actively or inactively throughout the viscera. This in turn would influence the mind as well as the rest of the body.

It is evident that any stimulus (knowledge, learning, etc., included) must affect the vegetative system as it must go that way and result in a reaction between the endocrine hormones, nerves and viscera before it gets to the brain for final action. Thus what we really educate is the vegetative apparatus of which the brain is but the servant.

The type of training the vegetative apparatus gets decides what we all shall do with respect to moral codes, such as conscience, law, habit, custom, etc., as well as everything else. So the condition of this vegetative system, the lack of co-ordination of its parts for example is the foundation of neurosis and psychosis.

What is the unconscious? Where does it come from? How does it function? We know that no form of sentience is possible except by the way of the vegetative apparatus. We know that stimuli range from the very

mild to the very great. The sight of an auto going by does not affect us greatly as we see many in the course of a day and pay no attention to it, yet it registers in our body as a sensation just the same. On the other hand the sight of an auto running into a pole is a major sensation, that is very noticeable. The former is an unconscious sensation that perhaps does not really reach the brain at all, yet it is registered on the vegetative apparatus because that is affected by sensation more readily than the brain.

So we may look for our subconscious in the vegetative apparatus—to come to the front in the form of dreams, intuitions, etc. The buried associations throughout the vegetative apparatus and brain form the unconscious. It is composed of certain types of pressure and tone within the viscera in combination with the endocrine balance together with past stimulation and pressure experiences of the viscera. When any of these are held down in the viscera it is the process of forgetting. Now and then the reins are released a bit and the forgotten breaks into consciousness, as a slip of the tongue, etc.

Get clearly the idea that the thing we call consciousness is a definite physical thing. It is a chemistry reaction and physical just like heat or cold or noise or odor.

The real consciousness is found in the vegetative system, which is composed of heart and lungs, stomach and intestines, kidneys and liver, etc., with their nerves (the solar plexus) plus the endocrines. Muscle, bone and brain are a much later development and subservient to them, although the brain has reacted upon them and holds a more or less dominating position due to the fact that it is the terminal station for all sensations of the vegetative apparatus. Yet the unconscious is clearly placed in same.

The conscious streams of energy that arise in the vegetative apparatus form our daily character and conduct. Our endocrine hook-up at birth plus environment are the determining factors. When the consciousness

disappears there is again a sort of balance of power—an equilibrium.

Now when there is a neurosis the psychoanalyst regards the psychic results as processes, instead of placing it where it really belongs, for a vegetative apparatus disturbance determines abnormal as well as normal behavior, emotional reactions and often mental conditions.

Why are we all not naturally brilliant and capable? If the brain power is based on organic defects largely why is it that the big healthy strapping men we meet are all beef and no brains? Psychology lays the whole thing to a subconscious defect, but physiology places it as due to the endocrine variations.

Men and women of great natural ability have something physical that enables them to reach any position of influence. With a good pituitary (ante in particular) they start off with the proper capacity. With a good thyroid they have the energy, zeal or ambition. With good gonad and adrenals they have the courage and power to carry through. Just as natural mental ability come from the proper endocrine hook-up, so the reverse arises from an improper endocrine combination.

In all these assumptions we are of course taking it for granted that there is no definite brain trouble.

In all types of arrested brain development, cretins, morons, idiots, imbeciles, etc.,—when not due to a brain defect and as a rule they are not—we can look to the endocrines every time.

Careful study has revealed that the action of the endocrines determines the mental state. We know that depression or excitement, obsessions and delusions, hallucinations, manias, melancholias etc., are all endocrine results. We know that dementia praecox comes at puberty, when there is a tremendous endocrine change, that certain types of psychoses occur during pregnancy, change of life, menstrual periods, etc.,—all endocrine changes.

It is said that perhaps three fourths of all mental deficiences are definitely inherited, yet the parents have

no mental troubles. Much work has been done in this respect by way of the Mendelian law. Furthermore, one parent may have a hyper-thyroid that gives no special trouble while the other may have a sub-adrenal. The child may get a peculiar endocrine combination that results in mental deficiency.

Certain hormones inhibit others. Where the vegetative apparatus is of the hair-trigger variety that may result in brain explosions, these hormones will inhibit this if the endocrines are good. If not we get a free rein for the tendency and mania may result.

There is still another way that insanity may result—or any other form of mental condition, in fact. The brain cells have thousands of nerves throughout them. Between the various cells we find necessary tissues which carry the nerves. This tissue is fed by blood. If the hormones are not in the blood in sufficient quantities, particularly of the thyroid and adrenals, this tissue gets thick and prevents the nerve impulses passing readily through the nerves.

We are definitely certain to-day that there is a quickly recognizable endocrine dysfunctioning in loss of sexual power which we know affects the mentality. Likewise exhaustion, (physical) fatigue, etc., affects the brain.

Irritability and excitability are traced to thyroid, secretiveness and slyness are characteristics of gonad, childishness is thymus, fighting and dominant are adrenal while quiet and calmness are pituitary.

Adrenals lubricate brain work. When one complains of brain fag you may be certain he has sub-adrenal and especially the cortex. You know the adrenal cortex governs the making of the brain, so they are closely hooked-up.

Why does the successful business or professional man start to break down? The well-known afternoon fatigue, vacations, etc. The adrenals go back on him. Then we get the real neurasthenic with irritability that may result in true psychosis.

"He comes of a nervous family", is often the cry. This means congenital adrenal deficiency. Children of nervous parents in early years have trouble with their eating, seem to lack appetite and energy and find it difficult to gorw to the proper weight and height.

They are high strung at school and do not seem to get ahead. Examined carefully we find the adrenal cortex is at fault and hence a proper nervous and brain development is not possible.

The adrenals meet the shocks and neutralize the effects of shock. In modern life man gets many shocks. Religion helps to balance. The war brought on nerve conditions by the millions. To compensate for the war shocks and stimuli mental states of every type have arisen.

The hyper-thyroid may be in perfect health, attentive, successful, vigorous, admired. Yet a sensation like the death of a dear one may so increase the secretions that all the other glands are affected and anything may happen from neurosis to psychosis.

Where the hyper-thyroid has a persistent thymus the person is subject to violent outbursts, brain storms, rage, violence, etc.

Those with a persistent thymus are subject to all shocks and sex perversions. Homosexuality is not psychic. It is usually thymic. If pituitary cannot work to help one out we see a wide range of moral irresponsibility—stealing, drugs, gunman and even suicides.

The pituitary holds certain sway that is very vital. Its growth depends upon the size of the sella turcica. If this is too small there is not only a poor physical but mental development as well. There is a difficulty in learning or retaining anything, degeneracy of the moral and intellectual type, epilepsy and sex perversions.

Post pituitary excess in a woman may cause mental conditions such as obsession, suspicion, anxieties, fears, etc.

Pituitary inferior children because of small size of

sella turcica means second and third offenders in the juvenile courts, pathological liars, incorrigibility, mental and moral deficients and defectives. Churches, charity organizations, etc., waste their time trying to correct them in the usual way. What they need is pituitary help. The juvenile mind may also be found in the subgonad.

CHAPTER VI

SEX, A CHEMICAL QUALITY

One of the most interesting of all the demonstrations that has been made in the growth of endocrinology is the conclusive proof that both primary and secondary sex characteristics can be removed, altered or intensified at will. Work in this connection was begun in 1849 by Berthold, a German, who carried out some most interesting demonstrations of many types of vertebrates. This work has been progressively followed until the whole subject of sex with its strange combinations and complexities is now pretty well mastered.

The elimination of the gonads in male or female completely alters the character and appearance of the individual. Early alteration of the male produces a type of sexless individual lacking in all the mating, home-loving and normal social instincts. But even more noticeable than this change in character is the change in appearance. The complete elimination of the gonads in the female has similar consequences, practically invariably giving evidence of a masculinization or inversion of sex seen in mustache, shorter hair growth on the head, reduced bust, slender hips, harsh voice and the lack of romantic or maternal instincts.

These cases are entirely different where procreating function is lacking, but with the *internal* secretions of the gonads are left intact. Under such circumstances no changes can be noted in appearance of secondary sex characteristics.

Here, then, lies the basis for investigation of the whole subject of physiological sex, which opened the way for a new understanding of the matter of proportionate

maleness and femaleness of which all human beings are composed.

The male or female is not a distinct sex. It seems hard for the uninitiated to realize this fact, but if there were space to explain this subject the evidence with which the reader himself is familiar could be placed before him in conclusive form

Look about you at the people you know. Note the human variation. Especially note the unusual, for which you need not look far. You will note some masculine trait in nearly every woman, and some feminine trait in nearly every man. We endocrinologists note these evident mixed characteristics in every human being. In some extreme cases you will find in women a tendency to moustache or masculine voice, a tendency toward masculine dress, or an aggressiveness of manner which indicates some proportion of the masculine trait. In some men you will recognize distinct feminine evidences, such as the high-pitched voice, comparatively hairless face, slender waist, motherly kindness, aesthetic or artistic inclinations, and many other more or less effeminate traits.

Careful study of the glands in recent years has yielded some interesting facts. If a child is born with a tumor in the adrenal cortex, he is apt to be of the mixed sex type—known as hermaphrodite. If a girl, it will present all the outward characteristics and appearance of a boy baby. In fact, many grow up as boys and only after puberty or on a post mortem examination is the mistake discovered.

If a tumor appears on the adrenal cortex of a woman, she undergoes a very remarkable change. Hair grows on her face, some even have beards and find their way into the circus side-shows as the "bearded lady"; she gets hard muscles, a deep male voice and is quite capable of doing a man's rough manual work. She naturally loses her feminine traits, is called coarse, "acts more like a man than a woman"—all because a single tiny endocrine failed.

Nature determines long before birth the primary or fixed sex by which outward signs were separated. The secondary sex characteristics, however, are the measure of the dominance through life of that fixed sex. These are dictated by the proportions of the endocrine glands. These latter determine how much male he will be and how much female she will be. All the endocrine glands have their say in this matter. The sex inclinations of the individual are reflexes of these proportions.

It is a well-known fact to all physicians and physiologists that the exterior of the body is no true index of the sex proportions within. Judges, bailiffs, jail matrons are frequently astonished to find the true sex of the offender. Criminal and medical jurisprudence is full of such strange discoveries. Post mortems tell a still more wonderful tale, because they cover a much larger proportion of the total number of the cases coming under conclusive observation.

The secondary sex characteristics are both mental and physical. Their urge is to attract, fight, flee, conquer, shield, destroy, cherish, obey and the like. In childhood the secondary characteristics are not very pronounced, but after puberty we begin to have unmistakable evidences. With feminine puberty we find an augmented action of the adrenal medulla, the thyroid and the posterior pituitary. With masculine puberty we find an increased activity in the adrenal cortex and anterior pituitary glands. I speak now of "normal" males and females; that is, about 90% male or female. The differences in chemical combinations of these glands give us the differences we find in boys and girls as to hair, voice, muscles, bones, skin, fat distribution, and a thousand other physical forms. These same differences in the balance of power, as it were, of these glands also account for the various cycles through which a woman passes from puberty to motherhood.

It is plainly evident that we are the results of chemistry changes in our bodies, which in turn are governed by the endocrines. Sex in its every variation

depends upon these glands. Hence, whoever can control these glands can control sex.

Our work has progressed so far that we can make a sex index to-day. It is now possible to classify John Smith as 67% male and 33% female; Mary Jones as 88% female and 12% male. We are able to do this by a test on the secondary sex characteristics. For the first time in history we are able to ascertain the definite causes of mal-adjusted sexuality and correct them by treating the endocrine glands.

The degree of masculinization in a woman gives us some idea of her adrenal cortex influences. The degree of femininity in a man tells us a great deal about his posterior pituitary gland, and vice versa. Which tendency will dominate depends upon the amount of secretions of these glands and these latter alter as they are affected by environment or direct artificial stimulus which we now have at command.

Environment in the family or otherwise is constantly impressing the endocrines and changing them one way or another. The influence of the mother may turn a boy into a girl in his inner conscience, such as was the case with Oscar Wilde; or the reverse as was the case with Dr. Mary Walker. Every stimulus reaching the brain affects the endocrines instantly through the pituitary which lies in the base of the brain, and has so commanding a control of the secondary sex characteristics as to bring these natural or unnatural results. Highly feminine mothers have masculine boys; masculine mothers have feminine boys; highly feminine mothers have feminine girls; masculine mothers have masculine girls. This is the conflict between the child of one sex type and his environmental influences of another sex type.

Even climate has a very drastic influence on the ductless glands. Warm climates reduce the necessity for hair and so there is a diminished need for much adrenal cortex. Thus in warm countries the women are more feminine, with earlier puberty, and the men take

on feminine characteristics more readily. In cold climates hair is needed so there is a greater adrenal cortex. Hence, the women and men are more masculine. In very cold climates native men and women cannot be readily distinguished by their features. The secondary sex characteristics are less distinct as we approach the extremes of climate.

To-day we know how these glands operate and in turn we know how to change them. When a woman is too masculinoid, with coarse features, flat breasts, angular appearance, hair on the face, and shows the hundreds of other evidences on the surface or in her conduct or character, we know that the adrenal cortex gland is supplying too much of its chemical and upsetting the remainder of the gland chain.

When a man is effeminate, wears corsets, has the body contour of a woman, high pitched voice, or other evidences, we know that his thymus gland needs attention.

And so down the whole list of gland combinations that make one tend too strongly to the other sex, we know what gland or chain of glands have caused the result and where to make the necessary correction.

The sex glands have occupied a prominent place in history, as shown by the literature of all peoples. Savages believed in gaining added strength and courage by eating the glands of their adversaries, or those of aggressive animals, as is the custom to-day in Latin countries and may be noted at every bull fight. The story of David in First Kings 1-15 shows that long before the Christian era the sex gland was regarded as the barometer of man's capabilities, and while they were inadvertently close to the truth, they lacked modern understanding which adds enlightenment to the whole subject and makes the matter of sex proportion and sex control an open book.

CHAPTER VII

LOVE, AN ENDOCRINE COMPLEX

WHAT is love? Thousands of poets and novelists have tried to answer the question, to analyze and interpret it. To-day science makes answer—and points the cold finger of definite knowledge to the very spot where love originates. Love, romance, the mating impulse are now known to be matters of chemistry and not of sentiment. They do not originate in the heart, the brain or the mind, but in a few tiny glands. They are not a prerogative of youth, but belong to all ages. They can be increased or decreased. Love may even be changed into hate, or hate to love through chemistry changes. Since love has a definite chemical basis, so love can be altered by altering the chemistry substances that make it.

The degree of love in man or woman depends upon the type or "hook-up" of their endocrines. A man with strong adrenals is apt to be strongly masculine and a good lover—frequently loves many women. If his pituitary gland functions well, he devotes his sole attention to his mate. He obeys the social laws in this respect, just as he obeys the speed laws when driving. If he is a virile male the urge to break the matrimonial law is like the impulse to illegal speed on a finely paved road with a high-powered car. Likewise the weak man never has the urge to break the marriage vows. He is a true and devoted husband in thought, word and deed—for definite chemical reasons.

The aggressive woman—the masculinoid type—gifted with high-powered adrenal glands—the woman with big frame, heavy voice and other secondary masculine characteristics, does not have the urge for mating

because she has too much of the man within her. The desire for mating in a woman—hence the desire to love—is in exact proportion to the adrenal energy she possesses, relative to the remainder of her gland combinations. The nearer a woman comes to the pure feminine type, the better lover she is. Likewise the nearer a man comes to the male type, the stronger is his love. You cannot imagine a smooth-faced swain with high-pitched voice being a "great lover".

In order for a man to love a woman he must physically, i.e. chemically, desire her. The amount, type, force or character of this desire depends primarily on the physical condition of the man, specifically the condition of his endocrine glands. Given the proper endocrine make-up in both man and woman—glands that harmonize—and you find perfect love, contentment and happiness.

Let a chemistry change occur in the glands of one or the other after marriage and you may find discord—immediately.

When a man and wife, who were properly mated at the time of marriage—properly on an endocrine basis—, are unable to get along together after marriage, it is now possible to correct the glands that have failed their owner—science can now change love's chemistry to the original condition that gave connubial bliss. There is no longer any necessity for law courts and divorce. Science can do what the law cannot do, restore the original impulse.

Love is a matter of chemistry, and science now controls such chemistry. The old "love potion" was a myth; the modern love potion is a reality. Women who become nervous, irritable, jealous, nagging, sensitive after marriage have an over-working thyroid because some other gland is under-working. By stimulating the sluggish gland, usually in such cases ovaries or adrenals, a balance of glandular activity is restored. The couple then live in happiness, whereas recourse to divorce courts usually results in another mismating.

For true love that runs smoothly, thank the pituitary gland which is largely responsible for its even course. The really womanly woman—the ideal wife—has a normal adrenal with good pituitary and gonads. With a normal feminine glandular make-up we find a truly feminine outlook—a fine combination of romantic and maternal instincts. A woman's wishes, desires, cravings, as her kindliness and loveliness, are born in organs of the body that depend upon the endocrines for their chemistry activity.

The desire for mating is also found in every healthy, normal person from adolescence to and including so-called old age. Both men and women living a life of enforced celibacy find the "wish" constantly present in their minds. The wish is born in the chemical changes of the body, and the messages sent to the brain are urgent. The purest souls in the world are bothered with primitive desires. They represent the chemistry of the mating urge which when properly allowed its freedom makes love. Suppress these wishes and the greatest biological urge is damned up. Such urge is second only to hunger, and will eventually break out somewhere—either in moral defect or nervous eraticism. In this connection religion seems frequently to help restore the equilibrium of the endocrines, as shown by many women who while suppressing the natural urge find expression in religious fervor. Their love is given to the Creator.

We must not overlook the maternal instinct. Women with little or no urge for mating may make fine mothers and be more anxious for children than those who love passionately. This is also a clearly understood endocrine proportion, for the maternal instinct is largely a post-pituitary function in the female.

Many a man is unhappily married to the frigid woman who has no sex life beyond the maternal instinct. Nevertheless such good women may possess a depth of love for home and family that far surpasses that of the woman dominated by sex instinct but lukewarm toward motherhood. Both types of woman can be corrected by

proper treatment—the frigid one may be given wholesome sex desire, and the more passionate one a burning desire for children.

The world is full of "lost love" at middle age, say from 40 to 50. During this period the wife experiences the great change in her endocrines. Unless a new and normal balance of power is immediately set up—one that creates harmonious equilibrium—she is likely to be affected in many ways. Irritability, excitability, fault finding, fussiness will result, if the thyroid gets the upper hand by over-secretion, whereas if it fails to perform its full requirements, the lady may lose her former vivaciousness and become moody, dull, melancholic and depressed. There are millions of such semi-invalids. If at this period a woman's adrenal cortex takes the commanding place, she may become rough, coarse, hairy-faced, or otherwise strongly masculinoid. Almost any strange anomaly may appear; even cancer stares her in the face.

If the husband remains constant in his endocrine make-up, he cannot comprehend these changes that have come over the idol of his life. Frequently there is friction, and he betakes himself to new friends and new fields. Most of the disagreements and divorces in middle life and after can be traced to an altered endocrine condition.

Men in like manner are subject to an endocrine change of a more or less major nature in middle life which affects their character. The changed mental processes express themselves in unexpected conduct.

Both love and the loss of it are the products of chemistry changes. These, in turn, are the result of changes in the endocrine system—pituitary, thyroid, thymus, pancreas, adrenals and gonads. Science now increases the activity of any or all of these glands—or decreases the speed of any that are overacting. It also analyzes, measures and weighs the processes of love by appraising accurately the processes of the endocrines—and what is more, it now actually turns hate to love

and restores to man or woman that lost blessing of marital happiness—the most precious possession of the human heart.

The reader may assume that in this chapter I have wandered from the subject of rejuvenation, but those who see the rainbow in these little pictures of love will more readily understand how and why the control of the endocrines brings human rejuvenation and increased longevity within man's power.

CHAPTER VIII

OLD AGE NO REASON FOR DEATH

ALTHOUGH it is obviously impossible in a book of this brief scope to cover the wide relation of the endocrines to human thought and action—a subject which gives new meaning to the whole mystery of life—it is essential that it be made clear that all of these endocrine processes *throughout life* have much to do with old age.

Old age is as varied in its characteristics as individuals are varied in their appearance and character. Yet the types of old age are as clearly understood to-day as the types of individuals, for they may now be classified by their endocrine proportions with an accuracy beyond the fondest hopes of science a few years ago.

No person has ever died of old age. Millions have grown old and died, and we say, "they died of old age." But millions have also died without being old. We speak of people being old and feeble, but the feebleness is not *because* of their age. Old age is not a disease, nor an ailment. It is a relative condition—a term applied to the years of life, but it does not presuppose weakness, illness or death. When old people die it is because of some ailment—*always*. Taken in time, most of these ailments are curable.

On the assumption that we must grow old, and must die ultimately just because we grow old, many erudite doctors have worked out fanciful theories. They have spent more effort and time trying to explain something they did not understand than they did in trying to do something tangible to prevent it. It seems natural to die sometime, but we have never found a single physiological reason for it excepting those that might be pre-

vented or cured. Show me the man or woman called "old" that has no physical defect, and I will show you a person who will live just as long as he or she remains fit. It is surely more sensible for doctors to put effort into prevention of the ailments that cause death than to waste their time trying to explain a situation that has never been proved.

It has been claimed that there is a persistent invasion of bacteria in our food which gradually preys upon our cells and gradually destroys them—that as we grow old we are less resistant to this bacteria and hence succumb to it. The truth of the matter is, we can resist this bacteria if the glands that produce the bacteria-fighting chemicals are kept active. Modern science handles this problem by methods that render the organism at any age capable of warding off such attacks.

Others have claimed that we become old and die because the brain becomes blurred by too many impressions—seeing and hearing too many things. In other words, the brain was supposed to be like a sponge; when it was well soaked, it could hold no more. When thus blurred the brain could not regulate the organs. As a matter of fact, the brain serves no such purpose—the vital organs work without any help from the brain. No amount of brain effort can make the heart stop beating nor the kidneys cease filtering. Further, there is no limit to what the brain can hold. Men like Chauncey Depew, John D. Rockfeller, "Uncle Joe" Cannon and countless others have had vastly more brain impressions than the peasants of Europe. Yet the peasants die young, while these busy-minded men live on and on.

One theory that has gone the rounds so often that even sensible doctors believe in it, is that our arteries harden, making the tubes smaller and smaller so that the blood cannot circulate properly. "A man is as old as his arteries" is a well-known saying—but there are many of 80 years or more whose arteries are as pliable as a child's. We get hardened arteries (arteriosclerosis) it is true, just as we get mumps and measles—but no person with

well-activated endocrine glands suffers or dies from arterial hardening.

Endless theories have been advanced, none of which hit the mark. I might, however, call attention to "Senescence and Rejuvenescence" by Child, in which it is shown that old age is not a fixed, unalterable law of life. The work of this professor at the University of Chicago, along zoölogical lines, was a great step forward since he departed from philosophical theorizing and made interesting experiments to show that the body cell can live indefinitely, providing proper food is furnished. Professor H. P. Osborn's "Origin and Evolution of Life", in which he adduces some fundamental ideas regarding the nature of life as energy with directive powers, was also a useful contribution to the subject.

It was not, however, until we obtained a real insight into the functions and nature of the endocrine glands that we began to make real progress in solving the riddles of old age and death. No one will deny that there is a series of progressive events from birth to maturity. Now we know *why* these changes take place, for every tiny change in the organism can be definitely traced to a change in condition of the endocrine.

After maturity we reach the type limit, at which we are set for a comparatively few years, devoted to reproducing our kind. Then, having served our purpose, come senility and death. Dr. Berman says there is a "process of degeneration which ultimately overtakes all the glands of internal secretion (endocrine glands)." Yet he cannot ascribe a reason for thinking so.

We know that the sex glands atrophy in time. We know that the thyroid loses its potency after 40 or 50. In most elderly people it is the thyroid that seems to have slowed up, resulting in slower movements, hazy memory, changes in feature, making many thin and sour or fat and stupid. The pituitary gland is another offender—for as it slows up many women become obese, the "fat and forty" type, dull and lazy.

In some cases the adrenals fail, bringing shrunken

features and a state of fatigue that is noticeable in men and women after 50. Such persons find that their memory is good and general health satisfactory, but they are everlastingly tired. This is clearly adrenal loss.

Dr. Alexis Carrel, famous co-originator of the Carrel-Dakin solution which saved thousands of lives, in the Great War, from gangrene, recently stated before the National Academy of Science that the white corpuscles in the blood are the chief protections against infection, and the agents that stimulate the growth of new tissue. "Even in extreme old age," he stated, "white corpuscles are present, but the healing processes are much longer, indicating that these corpuscles are not as active as in youth. If these corpuscles can heal surface injuries and rebuild new tissue there, it seems reasonable that if they are properly stimulated they might rebuild dead tissue worn down by age." Here is the physiologist's point of view, based upon demonstrable fact. The life and energy of the white corpuscle is maintained in its prime condition by the ionizing energy of life-giving rays, finding their source in nature—in the inspirational hormones of the endocrine glands.

For the benefit of those who have believed that rejuvenation was related directly to the gonads (reproductive organs) and their partial or total impotency, a clear explanation is essential. The senility and dotage of old age is no more directly due to depleted gonads than it may be to depleted pituitary, thyroid or adrenal. This is absolutely proved to-day. Failing gonads, to be sure, produce a marked type of old age which is recognized by everyone. But when it is remembered how many failures of the gonads there are before old age logically may be expected, and how many of such glands have been injured or atrophied in or before the prime of life, by disease, it will be realized that the gonads do not play an all-important part in the problem of old age and its rejuvenescence.

We know to-day that in men who had a strenuous active mental or physical life the adrenal glands are

called upon to supply the many requirements of their owner. In time these glands grow weaker, lay down on the job and gradually the active man of affairs finds he is slipping. If nature had endowed him with a splendid set of adrenals they would stand by him through all his vicissitudes and enable him to be energetic at a very old age.

If his adrenals give way under the stress and strain of modern life he starts to get a certain fatigability, brain fag, three o'clock fatigue and is all in by night. He becomes more sensitive to cold, gets nervous, easily irritated, often insomnia, low pulse and blood pressure, loses his former good appetite and probably puts on weight unless he worries himself thin. The effect on the mind is that of indecision. The man who formerly made rapid fire plans and decisions now finds himself the personification of indecision and lacks initiative. He gets hazy, subject to moods, easily upset, emotionally unstable and even hysterical.

If perchance his thyroid goes back on him he turns from a live wire, on the go all the time, a regular human dynamo, to a fat, dull, morose, lazy, sleepy, tired-out old man. His skin gets dry and he feels languid, even depressed and melancholic, wants to be alone. From the splendid rapid-fire talker he becomes taciturn, a slow thinker with a poor memory; instead of fat and dull he may get thin and sour. He gets a dim, shrunken, cheerless eye and slowly sinks into the great shadow of death.

The rise and fall of the great Napoleon can be traced to the rise and fall of his pituitary. When a man's pituitary gland goes back on him he loses his mentality very rapidly. He is unable to maintain sustained effort either mental or physical. Mentally he becomes sluggish, dull, apathetic, loses self-control quickly. He very often gets very fat, chiefly in the lower abdomen and legs, becomes sexually inactive, subject to obsessions and compulsions, easily discouraged and has little stamina.

I have merely suggested a few of the changes that take place in a person's physical appearance and mental capacity when some of the endocrine glands refuse to function properly—all due to the fact that there is a speck too little of the magic chemistry that is produced in these remarkable glands. Just a few drops one way or the other, too much or too little, of the thyroid, pituitary, adrenal or other glands and the entire body chemistry is thrown completely off its accustomed balance. We are certainly "fearfully and wonderfully made".

In some people all the glands fail in their work, in others only one or two. Sometimes, the glands get only a little behind. Sometimes they lag greatly—all of which accounts for the million and one varieties of ailments and changes that take place in different people.

It's no secret that women from 40 to 50 undergo a great physical change known as menopause. This is due to the fact that their sex glands atrophy—dry up, shrivel. We are all aware of the physical and mental changes that come as a result of a change in this great member of the endocrine gland group. If the other glands come to the rescue and function normally nothing happens, but should they not strike a harmonious equilibrium most anything may take place, from obesity to insanity.

So we find that if the endocrine glands of men and women stand by them they can grow to a ripe old age in full possession of their mental and physical powers. When the glands fail them they too fail unless perchance they seek new life, youth and health in the latest discoveries now offered by science.

To-day the endocrine glands can be regulated and controlled. This regulation and control is just as definite as pressing the buttons on the wall to turn on the electric lights.

Clemenceau was able to carry on during the great war because he reached into the realms of science and grasped the new wonders that it offers in supplying continued

glandular powers. Other foremost men have done likewise. Many of them no doubt had broken down in their prime due to the failure of their endocrine glands, but were able to have these glands reinvigorated through the modern methods of regeneration offered mankind to-day.

Nature has been kind to the brilliant men who are still in wonderful mental and physical health at advanced ages. Their persistence of youth or juvenility, so to speak, has been due to the fact that the cells of certain of the early glandular predominances have been kept active through clean, moral living, proper food, rest and freedom from petty worries. There is no doubt but that the thymus and perhaps the little understood pineal keeps up a certain activity throughout their lives, but we know that their other glands must also function well.

If their thyroid went back on them they would undoubtedly get sour and crabby or just plain stupid; if their pituitary did not hold up its own loss of memory, inability to think rapidly would be one result; if their adrenals lagged behind they would lose the splendid energy they possess—the vigor and vitality that stamp every one of them.

What does the future hold forth? We know that nature is able in some cases, where the endocrine glands have been kept strong, to make longevity with full physical and mental capabilities an easy matter. Science can now step in and lend a helping hand to the many whose endocrines are not able to stand the gaff, and increase the secretions, the chemistry changes, just as the sunshine is supplied to a plant, that has been kept in the dark, to make it bloom and grow strong once more.

CHAPTER IX

WHY DO THE GLANDS GO WRONG?

THERE are two very definite reasons why the endocrine glands become unbalanced and fail to function normally, according to Bailey. One group may be classified as *acquired endocrine deficiency*, and the other group under the head of *heredity*.

The greatest number of gland abnormalities are acquired by us and can be readily traced to the conditions incident to our daily life in all its various ramifications.

Microbic invasion must, of course, always be considered a major factor. The stress and strain of modern life, however, the struggle to earn a bare livelihood or to make a huge fortune, the fight for social or political prestige, must be placed in the foremost position. According to many authorities, over-eating is a direct cause in a larger number of cases than may be at first supposed. The continued use of alcohol very definitely injures the glands and many claim a deleterious influence from tobacco. Improper diet takes its toll as well as undernourishment and the use of too little liquids. Sexual excesses drain the adrenals, gonads, and the pituitary in a remarkable manner. External stimuli of all kinds have a decided influence on the endocrines. In this we would include the whole gamut of the emotions.

Heredity is a factor that must not be overlooked. We often inherit glandular imbalance. The germ plasm is a complex structure that mirrors the particular physical condition of its host at the time of its production. In view of their marvellously prolific manufacture in the

human body daily, it is evident that the particular cell which unites in sexual union represents the physical and hence mental condition of its owner practically at that very hour.

While in the first phylogenetic fragment retained in the body of the growing organism we can, of course, find the origin of the germ plasm yet the materials of which it is finally constructed must come from the chemistry of the body of its host. The materials of which the germ cell is made depend entirely upon the materials presented to it by the blood.

The materials supplied by the blood plasma in turn depend upon the body chemistry, upon the metabolism of the body, and these in turn are directly influenced by the internal secretions of the endocrine glands. It is true that the fœtus can be affected by the mother's chemistry, but we are speaking now only of the transmission of factors by the germ plasm. The only characteristics that can be transmitted through the germ plasm are those that have been given to a cell through metabolic and endocrine processes of the organism. Anything that in any way affects them affects the germ cell, for the latter is entirely a child of the former—a creature of uncertain chemistry combinations.

An organism that is weak in these processes can produce only a weakened germ cell. This weakness may be of any kind, capable of the widest variation. If the physical and chemical processes of the parent are not up to a high level, if there is any falling-off in the intensiveness of these processes, any variation whatever from normal, this will reveal itself in the blood plasma. This latter, being thus deficient or aberrant in the proper constituents that serve as materials for the germ cell, will naturally react upon the cell in accordance with the type and extent of this deficiency. On this basis it is readily seen that even acquired weakness of the parent may be transmitted to the child.

What the fate of the child may be from an endocrine

abnormality in the parent is hard to say. It may find its expression in malignancy, in mental or nervous conditions, or in a thousand other ways. It depends upon the extent of the endocrine disturbance and the amount of counterbalance that may be obtained from the other.

CHAPTER X

THE TWO MAIN FACTORS IN ALL ENDOCRINE GLAND TROUBLES

Imperfect endocrine functioning is not always easy to detect in many cases. We find few really gross abnormalities of a striking nature as a rule, but we always have one very definite clue which presents itself in nine out of ten cases examined. *That is, a diminished output of energy.* It is apparent from this that the chemistry processes are somewhat below normal. This is strikingly seen in the case of neurasthenia, the patient complaining of a feeling of constant fatigue, that dead-tired feeling that arises from the slightest exertion. This more or less constant fatigue expresses a diminished biological level and this in turn is due to sub-endocrine functioning. In this class, when the condition is accentuated, we find our nervous break-downs, our neuroses and even our psychoses to a considerable degree. Scarcely a business man past forty or fifty but that shows some evidences of neurasthenia. While it is ascribed largely to a depleted adrenal reserve, suffice is it to say that it represents an imperfect endocrine action.

A man who is tired from mental and muscular energy is merely a collection of cells that have transferred their energy and cannot secure ready replenishment from the natural sources. This replenishment is slower in consummation if the endocrine glands are functioning below par as they supply the catalysis necessary to chemistry processes that bring about this energy.

Looking more specifically as the basic factors involved we first of all come upon special collections of cells known as the lymphoid tissue. Through this fluid the

most complex chemical interchanges between all other tissues and the blood take place. To produce this lymphoid tissue requires comparatively little effort on the part of the chemical and physical processes of the body compared to the effort required to produce the highly differentiated body tissue. We must expect that what is produced at slight expense to the organism will be of a simple nature and so the lymphoid tissue may be regarded as a "cheap" tissue. It is evident that when the chemical and physical processes undergo a diminution in their intensiveness we find as a natural corollary a reduction in the production of the "expensive" (well-differentiated) tissues and a corresponding increase in the production of the "cheap" or lymphoid tissue. As a result of this development of lymphoid tissue we find the most far-reaching results in the human economy all indicating a reduction of the intensiveness of the biological processes as a direct result of imperfect endocrine functioning.

CHAPTER XI

IS ENDOCRINE GLAND DEFICIENCY THE CAUSE OF DISEASE AND OLD AGE?

We are indebted to Bailey's work in ferreting out the underlying factor in endocrine gland troubles, as explained in the previous chapter taken from his writings, to enable us to see daylight in our problems. The big discovery that stands out is the *lowering of the biological level*, shown by the diminished output of energy.

The evidence to date seems to show conclusively that a wide variety of physical and mental disturbances arise as a result of faulty glandular action. How far we can go in attributing old age, impotency, malignancies, nervous conditions, mental aberrations and the host of physical ailments to these glands is difficult to say.

The influence of all stimuli, microbic invasion, etc., are readily felt in these glands producing a lowering of their action somewhere along the line, thus causing a decrease in the biological level. Let us take cancer as a single example.

There must be a sub- or reduced functioning of one or more glands somewhere in the body to produce a malignancy. Injuries play only a minor rôle in cancer. Most injuries heal normally. When there is an endocrine imbalance in the chain of these interrelated structures, there is a loss of control over the growth and proliferation of the cells of the part of the body involved. The result is that, while cells are produced, they are cells of a lower biological level, hence are to a large extent undifferentiated, and proliferate without

regard to any plan or design. This readily accounts for cancers and tumors.

It has been seen that the ovaries are largely concerned in this process but the thyroid is always involved and usually the adrenals, testes, thymus, etc. Attempts at over-compensation in such cases results in a specific or general type of reduced biological intensity. As a sequence we find an unrestrained proliferation of relatively undifferentiated and primitive cells. These cells, in every type of malignancy, grow more rapidly than the "expensive" or highly differentiated cells. They get along on a far lower metabolism, a lower biological level, than the good tissue. It is a case of weeds growing more rapidly, because at less expense to the soil, than the complex vegetable structures and gradually smothering out the latter. This is exactly what happens in the case of malignancies as well as the "benign" tumors.

It may be definitely conceded to-day that endocrine gland deficiency *permits* the inroads of disease and the senile changes we call "old age."

CHAPTER XII

THE MYSTERIES OF THE LIVING CELL

In view of the amazing complexity of the human organism and the involved, inter-active processes, and complexes or energy, upon which organic life depends, it is surprising that life can exist at all. Looking at it merely as a complicated machine, and the human body certainly is a highly complex apparatus, it is wonderful how human life can go on for a week, a day or a single hour. Yet we see this marvellous laboratory operate for a life-time, in many cases over a century.

The fundamental unit in all life is the *living cell*. All animal organisms are composed of these minute units, each of which possesses the powers of growth, self repair and reproduction. In this respect the human body differs fundamentally from all machines made by the hand of man. For, although the human body involves mechanics, the apparatus is upheld continuously by the labors and contributions of billions of tiny artisans—the cells—each self-sustaining, self-renewing, and self-propagating. As far as we know to-day, under conditions of ideal nutrition and protection, the cell is capable of living and performing its vital functions indefinitely. The work of Alexis Carrell at the Rockefeller Institute proves this conclusively.

The well-known Dr. Harvey W. Wiley, former Chief of the Bureau of Chemistry in Washington, on his eightieth birthday in an address recently delivered at Lafayette College, laid major emphasis upon the vast importance of the living cell. As he put it, "Our sciences in their highest application are applied to bio-

logical problems. It is the living cell, after all, which is the most remarkable particle of matter. Sciences that do not affect the life of this planet are perhaps too abstruse to have any general vogue. In other words, all result of investigations in their ultimate application must reach the living cell. Even mathematics, as applied to chemical matters, cannot create an automization only to demonstrate the laws of its activity."

Amplified by our highest microscopic powers, a living cell may be observed the size of an acorn, so that it may be studied at leisure, watching its life processes and exploring its innermost secrets. Already man is getting a good understanding of what takes place within the little work-shop.

Looking at an endocrine gland cell we find that it is composed largely of a delicate network within which there is a nucleus—the real inner seat of cell life. Around the nucleus other bodies are disposed, such as the Golgi apparatus, the mitochondria, the centrosomes and the chromosomes, each of which have their parts to play in the chemistry activities of the cell.

While an enormous amount of research work has been done with the various parts of the cell structure, the most important revelations have come from the mitochondria and the Golgi appartus (or Golgi network).

The fundamental basis of the science of endocrinology, as has been previously explained, is the fact that the cells of the endocrine glands produce chemical substances called *hormones*. In other words, the cell *secretes* these substances. In actual practice we find that some cells secrete only a small amount of hormones. For example, in sub-thyroid conditions, when the thyroid gland is not producing a normal supply of hormones, the various *cells* of the gland are not functioning properly. They have "slowed down" and in serious cases many of these cells appear to be "closed down" entirely.

The difference in activity or "output" of the cell is

now known to be the result of a difference in the structure of the cell itself. This discovery has the greatest significance. Studying the several parts of which a cell is constituted, we are able to detect the most definite changes in the Golgi network.

In an inactive gland cell it is noticed that the Golgi network hugs very closely around the nucleus. When the cell is active the Golgi apparatus is spread out at a considerable distance from the nucleus. There are, of course, other changes in constituent parts of the cell, but none of them offer us such a perfect index as the Golgi network. In the laboratory a rapid and accurate means of determining the relative activity of a cell, and thus of the gland composed of the cells, is an examination of the Golgi apparatus, using the usual staining processes. Likewise the extent to which a cell is made to secrete, can now be readily determined in the laboratory by radiation or otherwise.

When the Golgi apparatus spreads out we know the cell is active. This spreading around the nucleus is unquestionably due to an increased intra-cellular pressure. The work of Da Faro and Fajal in this field is known to all biologists.

There are other auxiliary means of determining the effect of radiation on the glands by way of the cells. If a gland is not actively secreting, the cells are regarded as "loaded" or "charged." When the glands are radiated the cells are "unloaded." In the "charged" or resting state the cell, in fixed proportions, is transparent and stains faintly. After radiation the cell is made active—"unloaded"—a rapid chemistry process takes place and a relatively large amount of stainable material is found. Finally, under radiation of the gland itself, the transparent non-staining mucinogen of the cell is replaced by staining proto-plasm.

In further reference to the Golgi apparatus it should be noted that we never find it in dead or dying cells. Active, healthy, secreting cells have a large visible Golgi network, while it gradually becomes smaller as the

cell ages and disappears with old age, senility and death.

Only a few years ago the atom was the unit of the chemists and physicist. To-day, with its complexity of negative and positive electrons, it is known to be an elaborate structure, a storehouse of energy. The same is true of the biological unit—the cell. This also is now known to be of great complexity. In a manner almost invisible to the eye of the most powerful microscope, it accomplishes chemical transformations which can be duplicated in the laboratory only with the aid of powerful reagents and high temperatures. So the cell is revealed as not only a great chemical laboratory, but one of dynamic power, far more complicated than the elusive atom. Just as we are able to discern differences in the atom by changes in its spectrum, so we unfathom the mysterious process going on within the cell by experimental ionization.

Far and wide, wherever the most careful and scientific biological investigations are carried out, the cell is being studied in all its intricacy of function and purpose.

The more the cell-life is studied the stronger grows the conviction that what at first seem veritable miracles can be wrought with it. Mark what it has done in the brain of the bee or the ant. In that tiny dot of living matter, not as large as a pin head, there is a development of knowledge, a repository and a continuum of heredity, which embraces the entire science of aviation, architecture, engineering, economics, offensive and defensive warfare and a highly developed sociology.

To get at the crux of the rejuvenation problem, we must understand that our body is a collection of cells. Each cell is a separate entity with full powers of individual life. We are what our cells are. When the cells cease to function properly the whole body ceases to function as it should and gets old. Old age is, thus, a "disease" of the cell. It is the cell growing desuete. With this progression of events come the usual con-

comitants of old age—senile decay, loss of memory and virile power, wrinkled skin, depletion of muscle tone, etc. If we must believe that this condition is natural—that the cells grow old, and hence we grow old, and that no effort of man can stop this process—then we must confess that rejuvenation is only a beautiful dream that may be wished for but never attained. If we believe that the body cells can be restored—can be aroused from their lethargy and made to function actively again—then we must admit that rejuvenation is a reality.

The problem of rejuvenation, then, is to make the cells young again, and thus make the body young once more; for with this come all the evidences and appearances of youth. This means actually arresting the progress of senility, and setting the cells back to a point where they were years before.

McPhail writing in "Hygeia" gives the following interesting statement:

> "At the Rockefeller Institute for Medical Research, they have some fiber cells from the heart of an embryo chick. For ten years, these cells have been growing and multiplying regularly, until by now, had it been possible to have given each new part an optimum condition for growth, a mass of living matter would have been produced many million times larger than the earth. Though these cells have lived longer than the normal life of a fowl, there is no apparent diminution in their vitality and growth. They may be potentially immortal.
>
> Let us learn under what conditions this apparent immortality is obtained. These cells are kept in the body fluid taken from young, actively growing chicks. This fluid is changed sufficiently often to keep the food supply adequate and to keep the waste material incident to growth at a minimum. The cell mass is also

kept small enough so that each part gets unlimited access to the fluid. Two things produce similar results. If the cells are placed in fluid from a full grown fowl or if waste products are allowed to accumulate in the fluid, growth ceases. The immortal has become mortal."

CHAPTER XIII

METHODS OF GLAND CONTROL

I TRUST I have not tired my readers so far with the necessary preliminary explanation needed to obtain a fundamental grasp of the subject of rejuvenation. With the information in the previous pages understood we are now in a position to discuss intelligently the various methods that have been advocated for the control and treatment of the endocrine glands, for it is now evident to my readers that we must correct any deficiency in these glands to effect rejuvenescence or ameliorate the many other ailments that are to-day so definitely traceable to endocrine gland origin. All authorities the world over have for some time been in full agreement on the necessity of endocrine treatment to effect the desired results. Thus we find that all modern effort along this line has been directed toward the glands. The various methods used may be classified under three major headings:

GLAND OPERATIONS

GLAND PREPARATIONS

RADIOACTIVITY

THE TINY CELLS TELL THE STORY

Sluggish Cell

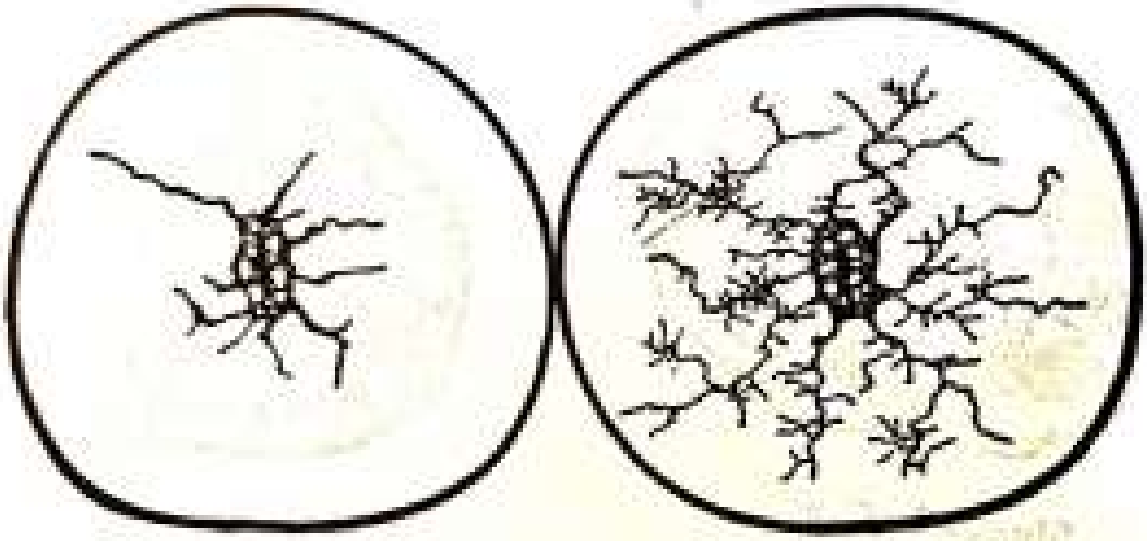
Active Cell

The amount of activity of the cells of the glands is determined by the position of the network, called the Golgi apparatus, as indicated in the illustrations above.

The sluggish cell (as seen in many old people and in the case of sick people) shows the Golgi network hugging closely and rather regularly around the nucleus. The active cell (as seen in healthy, virile old age and in youth) shows the Golgi network well spread out and enlarged.

When the cells are sluggish or inactive the glands cannot function properly and senility, disease, etc., appear as has been explained in the text. By causing these cells to become active once more the entire gland is stimulated to pour forth its normal supply of hormones. Thus the problem of rejuvenation and of the restoration of health generally lies in giving new life and activity to these tiny cells.

THE TINY CELLS TELL THE STORY



Sluggish Cell

Active Cell

On the opposite page are shown gland cells. In the above pictures we see cells of vital organs, known as dendrite cells.

The cell at the left is obviously sluggish and stunted, showing but few branchings. This type of cell we find in people who are immaturely old and in people with various ailments.

The cell at the right is plainly active. Note its full branchings and luxuriant growth. This is the kind of cell we find in healthy, vigorous old people and in those with bubbling youth.

Here, too, as in the case of the gland cells, the problem is to give renewed activity to the withered, almost dried-up, sluggish cell and thus bring about a high degree of healthy tone to the various vital organs which are composed of these cells

CHAPTER XIV

GLAND OPERATIONS

Perhaps the two best known names in the field of gland operation for rejuvenescence are Voronoff and Steinach. It is true that many others such as Lydston, Brinkley, etc., have made many claims in this field, but Voronoff and Steinach seem to have garnered the most publicity.

Voronoff introduced the famous animal gland transportation method. It was largely available only to men as such an operation in women is very hazardous. It seems from the claims of men in this field that the possibilities of rejuvenation by this method are limited only by the number of apes, goats, etc., obtainable, although the practice of human gland transplantation has found some vogue. This operation consists in removing one or both testes of the male and putting the testes of an animal or another human in place of same.

Scientific opinion is still unsettled as to the true value of this operation. Dr. C. G. Stockard of Cornell Medical School stated at the Congress of Physicians and Surgeons on May 6, 1925, "Old age does not come from disappearance of the gonads. You cannot prolong youth by gland transplantation."

Nevertheless, many surgeons of high standing feel that the theory is right. This whole subject has been admirably summed up by the "Boston Medical and Surgical Journal" from which I quote the following:

> "Within a few months Thorek of Chicago has published a book upon 'The Human Testis and Its Diseases' in which the literature relating to testicular function and transplantation has

been summarized in sufficient detail that one may get a clear idea of the experimental evidence upon which the theory of transplantation rests. Steinach of Vienna, Knud Sand of Copenhagen, and Voronoff and Retterer of Paris have been the leading investigators in this field. Apparently certain theories have been substantiated and may be regarded as facts. Other hypotheses are based less on fact, more on fancy, and one must exercise his discretion in accepting them. It has been definitely proved that the testis consists of two sorts of cells—those which have to do with spermatogenesis (the cells within the tubules and intertubular cells, or interstitial cells described by Leydig,) which elaborate an internal secretion, which to a large degree governs the development of the secondary sex characteristics. The activity of the interstitial cells is very clearly related to the activity of various other glands of internal secretion, notably the suprarenals and the pituitary gland.

The ovary also contains interstitial cells which perform a similar function in the female. It is a function of both male and female gland to inhibit the development of those characteristics peculiar to the opposite sex, and to promote the development of the characteristics of the appropriate sex.

The result of abnormal activity of the interstitial cells may be seen in cases of eunuchoidism, retarded or precocious puberty, and Fröhlich's disease. In many of these conditions, other endocrine glands also function abnormally, resulting in a distinctly unbalanced condition of the internal secretions. It has been asserted that homosexuality and dementia praecox are often accompanied by

demonstrable changes in the character of the interstitial tissue of the testes.

That the major part of the above contentions are true has been proved by the well-known phenomena attendant upon castration, and by the experiments carried out by Steinach and by Sand. These observers, working separately, have shown that the implantation of testes of rats in castrated females will be followed by the development of male characteristics, and vice versa. They have even implanted an ovary within a testicle, thereby causing the development in the animal of bisexual traits.

The technic of testicular transplantation has passed through various phases. That of Voronoff consists in dividing the testicle to be implanted into four longitudinal sections. The tunica albuginea of each is scored to admit of vascularization. Each portion is then fastened in position between the tunica vaginalis and the delicate cellular layer which overlies it. Thorek on the other hand advocates the deposition of the entire testicle, minus the epididymis, and with holes cut in the tunica albuginea, in the retrorenal space. There it is protected from pressure, and as has been shown by necropsies on monkeys so treated, the graft becomes vascularized from the lumbar vessels. Microscopic studies of numerous grafts made six months or a year after the transplantation show destruction of the spermatogenic portion of the graft. The tubules have metamorphosed into a reticulated structure in the space of which are leydig's cells.

The practical application of these theories has been carried out in animals in a most convincing way by Voronoff and Retterer, at the college of France. Only a few of their achievements can be mentioned here, but examination

of the monograph by Serge Voronoff—"Greffe Animale"—will prove the feasibility of testicular transplantation. A number of the cases cited are illustrated by photographs which show the changes produced. For example, young castrated bucks and lambs were subjected to testicular transplantation. They developed all of the secondary male characteristics and were quite different from the castrated controls. In old rams and bulls, who had long ceased to perform their sexual functions, Voronoff implanted the testes of young animals. Within a few months these decrepit old animals regained their coat, their flesh and their sexual vigor. One ram, so treated at the age of 12 years, at 18 years was still vigorous. When 17 years of age he begot a healthy lamb.

The application of these principles to man is a much more complex problem. Old age in man is usually accompanied by many of the tracings of time which obviously cannot be erased; the supply of fresh gonadal secretion cannot offset the effects of organic changes in the vital organs. Glands suitable for use are difficult to obtain. Thorek, by means of blood tests, has found that only 2 or 3 kinds of apes are of sufficient consanguinity to serve as donors.

Like any new operations, testicular transplantation will have to pass first through a period in which it will be desired by the neurotic and the overstimulated. In many such cases its results will probably be unsuccessful. Its employment will be checked, fortunately, by the difficulty in obtaining material for transplantation. Later on, it will be adopted by the more conservative surgeons as a legitimate means of therapeusis in certain well-defined types of cases. Just what these will be, can only be learned by experience.

> At any rate, a new chapter in surgery and physiology is being written. It will be surprising if, from this most interesting field of experimentation, something of value is not obtained for mankind."

Steinach's work, on the other hand, has not received such favorable comment. While he has done a great deal in the field of gland transplantation, yet he is better known for his so-called "Steinach operation", which did not consist of transplantation, but is known technically as ligation of the vas deferens and also vasectomy.

Reduced to its simplest terms, Steinach achieves rejuvenation by stimulating the Puberty gland at the expense of the Reproductive gland. If the reproductive function is paralyzed by severing the duct of external secretion, then the gland of internal secretion, the Puberty gland, tends to expand or "proliferate". As the cells of the Reproductive gland are denied an outlet, they shrivel up, and the Puberty gland increases in size, and functions more vigorously. It is this increased activity of the sexual gland of internal secretion which he claims revitalizes and re-energizes the whole body.

It has been explained that the reproductive function is paralyzed at the expense of the puberty, or internal function. This may give the impression that the powers of reproduction are destroyed, and the individual will no longer possess the ability to procreate or become a parent. If the operation is performed on both sides (bilateral) this is true, the person then becomes sterile. However, if the operation is performed on one side only (unilateral) the male subject still retains the reproductive power, from the side not operated upon, as the spermatozoa is merely blocked from one testicle. The other testicle remains unchanged.

The outlet or duct of the Reproductive gland is called the vas deferens. The male has two such ducts, one from each testicle, leading to the external organ, or

penis. If a portion of the vas deferens, or vas, as it is commonly called, is removed, the result is termed "vasectomy".

Strangulation or construction of the vas deferens is designated as "vasoligature". The Steinach operation is a combination of both, and the sex gland, in effect, is changed from a mixed gland into a ductless gland. By this concentration of a dual gland into a single functioning one, the internal secretion Steinach claims is greatly stimulated, with results that are popularly called "rejuvenation".

While the bilateral operation renders the person sterile, because both channels through which the spermatozoa pass are blocked, it does not interfere with the sexual act or potency. Only a small part of the ejaculation fluid emanates from the Reproduction gland. The secretion of other glands, including the prostate, form the major part of the sexual ejaculation, so that only the spermatozoa, or life-giving cells, are eliminated.

In spite of the evidence presented by Professor Steinach this particular operation has not met with the favorable comment that has been given the gland transplantation. The "Journal of the American Medical Association" made a very vitriolic attack upon it. Other journals and writers have found very little to recommend in it. In fact Osburn, who did a great deal of experimental work in this field, finds vasectomy produced no testicular change. His work throws an atmosphere of doubt about the accuracy of Steinach's work in this field. I personally have examined 14 men who received the "Steinach operation" and found good results in some of them. What new developments in this field may arise no one can say. We surely cannot condemn Professor Steinach for his sincere efforts at least.

Dr. L. Cardenal, Professor of Surgery in the Madrid Medical School, gave his experiences concerning the Steinach ligating operation before the Royal Academy of Medicine as follows:

"I tried this method on fifty-eight male persons of whom only thirty-eight remained for final consideration. In fourteen of these treatment failed completely. In the other twenty-four the effects were marked, as shown by increase in weight, changes in the skin, and growth of hair. The improvement in mentality in the successful cases was very remarkable indeed. One patient over seventy years old, illiterate all his life, has started to learn to read. In many the development of libido, potentia coeundi, has been such as to be considered by the patients a sign of disease. The best results were obtained where the vas deferens were ligated on both sides. The prematurely senile patients without organic disease showed the most improvement."

The ligating operation as applied by Dr. Steinach and others, is to-day practiced in some cases upon men. It is not applicable to women, and is applicable to men only where the gonads are primarily at fault. While this Steinach operation is relatively simple, it is attended by some element of danger. A great deal of the success of the operation depends upon the skill of the surgeon, for in cutting the duct he must observe scrupulous care in not mutilating the numerous nerves and vesicles with which the spermatic cord is so richly supplied. It is evident that at the hands of any, save the most expert technician, great damage may be done which cannot be remedied.

Corners in writing of Steinach's work says:

"No one can explain why the Steinach method sometimes fails to rejuvenate. Evidently, for some reason or other, no proliferation of the interstitial tissue ensues. Perhaps the vitality of the entire endocrine system is too exhausted to respond to the call of the gonads. The technique

of the operation may be at fault. The success of the operation depends upon the reaction of the entire endocrine system to the new stimulus."

The "Journal of the American Medical Association" in commenting on the Steinach operation has this to say:

"It so happened that, during the closing years of the nineteenth century, vasectomy was performed on elderly men the world over as a means of mitigating the ills consequent on senile hypertrophy of the prostrate. Hundreds of cases were reported in the medical journals of those years by noted surgeons in Europe and in America. In no instance was a restoration of youthful vigor mentioned. Recently Haber and others have practiced vasectomy extensively for the same purpose, stating expressly in reporting their cases that no rejuvenation has been detected. Yet in none of Steinach's many publications is there a reference to these vasectomies, old or new. Fortunately, there are already available records of failure which permit due warning against enthusiastic acceptance of the Steinach procedure."

In closing this chapter on Steinach's work it may be remarked that to some extent he evidently abandoned both the gland transplantation as well as the vasoligation method and advocated a method of X-ray sterilization. This later method however seems to be adaptable largely only to women.

The X-ray technique of Steinach consists in the application of these rays over the ovaries, the idea being to bring about a proliferation of the interstitial tissue of the ovaries and permit the sensitive reproductive tissue to atrophy. He stresses the fact that the X-ray must be so carefully applied that it withers only the ovarian vesicles containing the eggs (Graafian follicles) but must not endanger the interstitial tissue in any way.

It is evident to any one familiar with the deadly powers of the X-ray that this procedure is fraught with dangerous and even disastrous consequences, for if the interstitial tissue is injured in any way the patient ages even more rapidly.

Dr. Kammerer, who was associated with Steinach in much of his scientific research work, and who had an unequalled opportunity for accurate investigation of the results of this work, states in a book on rejuvenation:

> "Even though it seems that the problem of rejuvenating women was solved by the discovery of the rejuvenating powers of the X-ray, there is still one remaining difficulty; the correct dosage of the X-ray. It is impossible to compile a chart to guide the consulting physician and the X-ray expert, as the dosage of X-ray depends upon the individual's condition, and has to be ascertained with the greatest of care. What is needed to bring about rejuvenating effects by X-ray is a so-called stimulating exposure which will result in a proliferation of the interstitial tissue of the female generative gland. This stimulating exposure should result in nothing more than a withering of the ovarian vesicles containing the eggs (Graaffian follicles) but should not endanger the interstitial tissue. If the exposure is too weak to stimulate the proliferation of the interstitial tissue, no result whatever is achieved; the exposure would simply be ineffective and nothing would be changed. If the exposure is too strong, not only would there be a withering of the generative tissue, but this withering would extend to the interstitial tissue and possibly destroy the whole organ, thereby bringing about the extreme contrast of what is intended. Instead of rejuvenating results, an acceleration of the process of aging would ensue."

In an article in the "Medical Journal" of December 17, 1925, Dr. Harry Benjamin reviews his work both with the Steinach operation and X-radiation. Benjamin claims splendid success by these two methods and I do not question his results, for he is a very capable worker in the field of rejuvenation.

In summing up the case for rejuvenation by operations on the sex glands or X-radiation of same, as described above, it is evident that the advocates of these methods place their sole reliance on the theory that the sex glands control all the other glands. It is true that the glands form an interlocking directorate as I have outlined in Chapter III. They are so exquisitely balanced and mutually interdependent that an inefficiency or superfluity of any one of them affects the others in a greater or less degree. It might appear logical, therefore, to feel that by activating the sex glands (if such a result is actually achieved by the methods I have described above) the rest of the glands of the endocrines system are normalized.

Unfortunately, however, no evidence of a dependable character has been adduced as yet to show that such is the case. That the stimulation of the sex glands is of great import in general rejuvenation work no one doubts, but that the sex glands control all the other glands of the body has never been shown to be a fact. One evidence of this is the fact that eunuchs have been known to live to a ripe old age with splendid physical health.

The newer technique in this field is based on treatment of the various glands, a method first introduced by Bailey several years ago, and by this method the X-ray offers considerable promise in the hands of an expert. The use of the gamma ray of radium is likewise warmly advocated and is being used more and more each day. I have used it myself under Bailey's direction with splendid success.

CHAPTER XV

GLAND PREPARATIONS OR ORGANOTHERAPY

THE use of gland preparations is based on facts that have been proven in clinics throughout the world. This practice is based largely on the premise that if a gland is working below par the administration of portions of similar glands of animals will help make up for the glandular deficiency. Thus if one has a lowered thyroid gland activity, by administering animal thyroid glands in tablet form it would seem rational that the lack of secretion in the patient would be made up by the elements administered. This was brilliantly proven many years ago when thyroid extracts were administered to persons suffering from myxedema and cretinism. Under this treatment the patients took on a new lease of life. To-day cretinism—that horrible condition of apparent imbecility in children—has been wiped off the face of the earth by thyroid gland tablets.

The basis of the use of gland preparations, called organotherapy, may be divided into four main groups.

1—When the diagnosis shows that a gland has an impaired function, due to heredity or other cause, the gland substance of an animal is given to replace the lack on the part of the patient. This is known as substitutive treatment.

2—When it is desired merely to stimulate the action of a gland the animal gland substance that corresponds to same is given to supplement the gland work. This is called homostimulation.

The above two uses are somewhat alike, of course, and form the real basis of such treatment. In a measure

it is simple in the extreme. It is certainly a sounder procedure than the surgical operations previously referred to. If the pituitary gland needs help give pituitary gland substance, if the adrenals are down give adrenal gland substance. If more than one gland seems to be improperly functioning then give a combinatoin of gland substances.

3—A third use of gland substance is known as symptomic. For example, extracts such as pituitrin and adrenalin (both discovered by Abel of Johns Hopkins) have certain pharmacologic and physiologic actions. Thus they are used to produce specific therapeutic action without respect to whether the patient's glands are functioning normally or not. Thus they are not administered to correct any underlying endocrine condition, but given on the same principle as drugs.

4—A fourth method has been classed as empirical, that is, experience has shown that certain therapeutic results have been obtained but we do not know the cause or effect. Thus many conditions respond to organotherapy although we do not know that such causes may be due to any particular endocrine deficit. Take the case of rheumatoid arthritis. The use of thymus gland seems to improve this condition, yet we have not the slightest evidence that the thymus alone is the cause of arthritis.

The practice of organotheraphy has become very extensive in the medical profession during the past few years, and as previously stated there is scarcely a physician who does not prescribe these products or administer them in some form or other. It cannot be said, however, that complete success has attended the use of organotherapy medication in all cases. Insulin, for example, is of some value in diabetes, but it is not a specific. All we can say is that under continued treatment the patient shows improvement in many cases.

It is to-day definitely known that old age is an endocrine gland condition. As the years advance the thyroid gradually loses its full functioning power. It is true that

the other endocrines as well diminish in size and activity as the years advance, but the tremendous importance of the thyroid in the body make the loss of functioning a very serious matter. Lorand finds that the pituitary, adrenals and gonads degenerate and take a part in the old age drama. Sajous is of the opinion that the adrenals are largely at fault and states that those who live to very advanced years have splendid unimpaired adrenals.

In Lorand's recent book on "Life Shortening Habits", we read:

> "Old age being caused by degeneration of the endocrine glands, especially the thyroid and sexual glands, all that is necessary to secure rejuvenation is to improve the condition of these glands. The best and easiest way to do this is to administer by the mouth extracts of these glands, after their extirpation from healthy animals."

And yet I fear that this statement is just a bit too optimistic. That rejuvenation and the correction of most of our ailments may be achieved through the endocrine glands no one to-day doubts, but that organotherapy alone is the simple solution cannot be conceded as we lack evidence that such is the fact. That we are hot on the trail of the Fountain of Youth through the use of glandular substances we cannot deny, for they have enriched our medicinal resources to an undreamed of extent.

I have personally had a very wide experience in the use of organic substances and have achieved splendid success in many cases. If the matter were as simple as Lorand has put it above there would be nothing further for me to say. But such is not the case. While organotherapy may be used in treatment for rejuvenating effects, yet alone it does not offer the solution, although this method of treatment must be accorded a high place

in therapeutics to-day. Its use has already proved a great boon to suffering humanity, and I frequently recommend organic substances in conjunction with the Bailey Treatment. Dr. Louis Berman, one of the most brilliant endocrinologists of this country, has been much in favor of this method, although he frankly acknowledges and realizes its limitations.

CHAPTER XVI

RADIOACTIVITY

The third method that has been developed for endocrine gland stimulation and control as a means of effecting rejuvenescence has been the use of radioactive substances. It is in this field that Bailey made his brilliant success. By correlating his researches in endocrinology and radioactivity he has placed modern treatment of the human body on a sound scientific basis. His work has been confirmed in the leading clinics throughout the world and in advanced medical circles has already been adopted as the foremost method of treatment.

There are two distinct things that Bailey accomplished. He made very definite findings in the biology of the endocrine gland mechanism and also produced the means through radioactivity of correcting faults in this mechanism. His work is not difficult to understand, so that I will give the main features of his discoveries here, and take up the particular methods of radioactive technique in another chapter.

I have already described the hormones of the endocrine glands. These marvellous chemical substances perform their functions by entering into the blood stream from the glands and acting directly on the various cells of the body. The secretions or hormones from the thyroid gland, for example, take part in the metabolic processes of *all* the cells throughout the body, while the secretions from other glands, such as the pituitary, for example, affect only certain types of cells. It is important to bear this fact in mind.

Once the hormone enters the cell structure the exact

action that takes place is largly that of *catalysis*. This means it brings about chemistry changes in the cell without itself being altered. Just how these effects are brought about we do not know, as the subject of catalysis is still in its infancy. In all probability other types of action take place in the cell on the arrival of the hormone and no doubt the hormone in some way ultimately becomes a part of the cell itself. Yet the outstanding action of the hormone is a catalytic one. On account of the different effect on a cell by the hormone of the adrenal gland and that of the thyroid or other gland it is evident that the catalytic action of the hormones of the various glands is different for the particular gland, as the catalytic action of the thyroid hormone is different from the catalytic action of the pituitary or other gland. Thus this rule of hormone action may be expressed as follows: the hormones or secretions of a gland exercise an action on the cell structure, by catalysis and by chemical combination, that is specific for that gland or for that particular cell.

Bailey has made an improvement on the above definition by stating that the catalytic action of all hormones of all glands is identical, but that the chemistry of the hormones being different the chemistry combinations made in the cells are naturally different. Furthermore, the *amount* of catalytic action that a hormone may exercise on a cell varies with the particular gland from which the hormone arises.

Another feature of tremendous import is that there is a special membrane surrounding all cells. This is known as the lipoid membrane. In order for anything to enter the cell it must penetrate this membrane. The ability of a hormone to penetrate the membrane and thus enter the cell depends upon the particular gland that gives birth to the hormone. The thyroid hormone is of such a chemical nature that it can penetrate all membranes and thus the thyroid takes part in the metabolic process of all the cells of the body. The adrenal hormone on the

other hand cannot penetrate all the membranes. It is able to enter only certain cells and hence its action is specific for those cells only. This explains what I have described in some detail in previous chapters as to the effects of the different glands on the different processes of the body. The whole secret lies in the ability of the hormones of the glands to penetrate the lipoid membrane of certain types of cells and thus affect only certain types of chemistry changes in the body.

Bailey's researches disclosed three vital features in connection with the endocrine gland processes.

First, he confirmed the work that has been done by scores of others in showing that at times the endocrine glands became sluggish and did not produce enough secretions and that as a corollary to this other glands became overactive and produced too much secretion. In either case the body suffered in one way or another as heretofore explained.

Second, Bailey discovered that frequently a gland may be producing the proper amount of secretions but that these latter lacked the full powers to carry out their work. In numerous tests made the patient had the normal adrenalin content, for example, in the body and yet the patient showed all the evidences of a sub-adrenal condition. The hormones lacked something in their *substance* that prevented them from doing all that they should do. Chemical analysis failed to reveal the missing constituents, yet the hormones were unable either to penetrate the lipoid membrane or to give full effect to their catalytic functions. The same situation was found by Bailey in animal gland substances, which no doubt accounts in some measure for the variable effects often produced by organotherapy.

Third, Bailey discovered also that the cells of the body, or of certain organs, were of such a nature with respect to their lipoid membrane that normal hormones were unable to penetrate the membrane and enter into the cell structure to take part in the cellular metabolism.

It may be well to note in this connection that Dr. C. C.

Moyar of Pittsburgh, one of America's leading endocrinologists and specialists in radioactivity, has put forward the theory that in conditions where the hormone is unable to penetrate the lipoid membrane the electrical attraction for the hormone (cellular electro biochemistry) by the cell structure is not sufficiently intensive due to lack of proper ionization therein and change of cellular pressure.

The above discoveries of Bailey have placed him in the forefront of scientists in the field of endocrinology for they mark the greatest advances yet made in the mysteries of the endocrines. His work gives us a clearer idea of the mechanism of old age and disease generally than we have ever had before and makes very clear to us why we do not always succeed with gland extracts and gland substances. Without these discoveries we would not have made the tremendous strides that have been taken in the past two years in this field.

Thus we now see that any one of several things may be happening. Either a gland is functioning below or above normal (producing too little or too much secretion), or the substance of the secretions or hormones may be faulty or the lipoid membrane of the cell may be resistant to the penetration of the hormone. In fact the whole three situations may exist in the same person. Is it any wonder that the best of doctors have often made improper endocrine diagnoses? From all appearances it may appear clear that a certain gland is deficient in its secrections whereas it may probably be secreting ample hormones but the hormones themselves may be deficient in substance or the cell structure that it normally reacts with may be resistant to the easy permeability (also called penetration, absorption, diffusion or solubility) of the hormones.

It became evident, therefore, that some activating influence was necessary that would accomplish three things, 1—stimulate the glands to increased action, 2—stimulate the hormones so that they would be capable of greater catalysis, etc., 3—render the lipoid mem-

brane of the cell more permeable. This was the task that Bailey set out to accomplish.

Bailey undertook to solve these problems through the use of radioactivity as I have already intimated. The modus operandi of his technique was through the application of rays that arise from various radioactive substances. In the use of rays for therapeutic purposes Bailey has been known the world over for his able work. His researches with radium and other radioactive elements has placed him in the very front rank of the eminent scientists in this field, which included Madam Curie, Sir Ernest Rutherford, Soddy and others of like fame. The Bailey Radium Laboratories at East Orange, New Jersey, of which he is the director, have acquired world-wide recognition.

As the use of rays in endocrine work has entirely revolutionized glandular treatment and paved the way for real rejuvenation I wish to devote an entire chapter to the story of the general action of rays in making chemistry changes in order that we may get a clearer picture of Bailey's startling work. With this knowledge we will be able to understand better the simple procedure that he developed to accomplish most far-reaching effects on the human body through the correction of endocrine gland dysfunctioning.

CHAPTER XVII

HOW RAYS PROMOTE CHEMISTRY ACTIVITY

SUNLIGHT is the most important factor in the preservation of health and vitality. It is just as necessary for growth and perpetuation of life as liquid and solid food. "When the sun does not enter, the physician enters," says an old proverb. It has been found that the greatest mortality occurs in the narrow streets of cities and in houses having northern exposure. The inhabitants of southern mountain slopes are stronger and healthier than those living on northern sides. Inhabitants of secluded valleys, where the sun rises late and sets early, are generally afflicted with peculiar diseases, chiefly due to a lack of direct sunlight and its salutary power to dissipate and decompose noxious vapors which accumulate in dark and low places.

The sun indeed is the great and ultimate source of all power which manifests itself in the inorganic as well as in the organic formations of matter. Plants require sunlight above all for the completion of their complicated organic combinations. While the lowest species of life, such as fungi, are capable of developing in darkness, the higher plants, which principally support animal life, always depend upon the rays of the sun for the processes of assimilating the elements of soil and atmosphere. They may require especially the non-illuminating, ultra-violet rays, which we know to be most active in the production of electro-chemical effects. Likewise the animal body is to a large extent directly dependent on sunlight for its growth and healthy development. It is a well-established fact that, as the result of an in-

sufficiency of light, the febrine and the red blood corpuscles become diminished in quantity, while the serum or watery portion of the blood is increased. A total exclusion of the sunlight induces the severer forms of anemic diseases, originating from an impoverished and disordered state of blood.

There is the well-known sun-bath, carried to a high degree of perfection in the Swiss Alps and in various sanitaria scattered throughout this country and Europe, where tuberculosis, rickets and other internal disorders are treated.

It is probable that a large factor in ancient sun-worship was a recognition of the rejuvenating influence brought about by the ultra-violet rays of the sun. In ancient India exposure to the sun's rays has been practiced from time immemorial, with the direct intention of stimulating the gonads to increased activity.

Thousands of us have had the opportunity of lying out in the sand at the seashore and soaking up the ultra-violet rays of the sun for days at a time. We know by experience that this stimulation is an actuality. This is an ionizing process. In fact, it is quite definitely established that the most animal-like sexual appetites of savages and those living in the tropics is due to this very stimulation by the ultra-violet rays of the sun, which also develops in the peoples of southern countries that fiery temperament and keen capacity found only among those who mature at an early age.

Paul Kammerer, the noted biologist, who conducted many experiments in common with Steinach, recalls the fact that hot climates accelerate puberty, that southerners are more passionate than those born under colder stars, and that the effect of travel in the tropics on the passions is marked.

One of the great discoveries man has ever made is the fact that Nature effects chemical changes of a most complex nature by means of radiation. Through this knowledge we are able to take a peep behind the curtain. Perhaps we shall see more some day, but even

with the slight vision we already have we are able to revolutionize medical treatment, basing our work on Nature's marvellous technique in utilizing rays to accomplish chemical changes.

The most important researches of modern chemistry, which are admitted by the world of science to contain the most portentious of all man's discoveries, lie within the field called photosynthesis. Herein the chemist, the physicist and the biologist join hands, for in this work the effect of vibratory activity known as rays is being used for searching out the deep and hidden secrets of life upon this planet. In this work a very large measure of success has been reached. Already hope looms up to the effect that we may at no very future date produce directly from inorganic matter (such as clay, sand, oxides, sulphides, etc) sufficient food substances for the supply of the whole human race. This is far from being a dream at the present moment. The energy content of our food is now derived from the sun through the agency of green plants, making the agriculture as much a fuel producing industry as coal-mining or oil-well-drilling. Thus fuel for human and stock consumption is obtained through the chlorophyll of the plant—a very inefficient process. Photosynthesis is the term applied to the energy-storing process of plants, because the process consists in the synthesis of sugar from carbon dioxide gas and water with the aid of the rays. Some of these rays, of course, are visible light rays, but much more important are those of shorter wave length, such as ultra-violet, and still shorter wave lengths running down to the very shortest known.

Carl Alsbert of Stanford University in a paper before the American Chemical Society on the theory of population and its food supply, says:

> "In view of the great progress in photochemical theory in the last decade, the problem of synthetic food supply is far from hopeless. The solution may be nearer than most men think. What is most probable is that practical

application will wait on economic necessity. The work in pure science is likely to be completed before this necessity arises. The solution of the world's food and fuel problem will be the same, and it will, to a far more distant horizon, increase the bounds that now tend to limit the growth of population."

Professor Edward Baly, speaking before the British Association for the Advancement of Science, said, "We have succeeded in the laboratory by a process known as photosynthesis, the building up of matter by the action of light, in producing several products which have hitherto only been produced by plants. It is common knowledge that plants, by the aid of sunshine and green coloring matter, convert inorganic substances into organic substances. By means of short wave lengths and malachite green in place of the plant green coloring matter—chlorophyll—chemists have first converted inorganic bases into formaldehyde and again into sugars. Knowledge is advancing so rapidly in these lines that hopes are expressed that ultimately protein—food substance—will be artificially produced."

Under some of these invisible rays, diamonds turn luminously fluorescent in the dark, while ordinary glass exposed to radiation takes on colors such as violet, and brown or even black. Alkaline salts become yellow, violet, blue or green; colorless topaz acquire a rich orange color; colorless diamonds from Borneo become brilliant citron yellow in fourteen days.

Doctor Squance, speaking before the National Congress of Chemists, says, "I took a sapphire whose color was a pallid pink and it became a pigeon blood ruby, one of the most valuable. A sapphire which had a sickly green tinge was by similar means turned into a deep green emerald. The original stones were practically worthless; the radiated products became practically priceless." The mythical luminous gems of the Egyptians mentioned by Herodotus and Plato, unnamed

jewels which were dedicated to the gods, and which "burned at night like lamps filled with the fires of the stars over the secret shrines" were doubtless natural crystals which had come in contact in some unexplained but natural way with these mysterious rays below the visible light range.

We know that all chemical activity of a plant that results in growth, color, shape of foliage, etc., depends upon the amount and kind of rays that reach the plant. Too intense radiation causes it to wither and die. When not enough radiation is supplied the plant fails to grow normally. The rows of corn planted along the stone walls where the sun does not fully shine are always the poorest rows—seldom, if ever, producing good ears. Some plants need only an infinitesimal amount of such radiation. These are the plants that grow best in shady places. Others need a great deal and must have the full sunlight.

Man has been duplicating nature in this field lately, chiefly with electric lights. In commenting on his experiments in making plants grow more rapidly with artificial light than with natural light, Professor Tiedjens of the Massachusetts Agricultural Experiment Station recently remarked:

> "In general, it was found that there was a direct positive correlation between intensity of electric illumination and rate of growth. The length of the growing period was shortened by two and four weeks, respectively, for the higher intensities. The seed stalk was started before a good marketable head was formed in the varieties commonly grown by market gardeners."

Professor Findlay of Columbia recently gave astonishing proof that artificial radiation can double the speed with which flower and vegetable plants grow. He reported as follows:

> "The speeding up of vegetable growth is ac-

complished by the installation of "overtime" in the hothouses. The plants are permitted to sleep for an hour after sundown. They get an hour's repose; then the electrics are turned on, and the flowers absorb the artificial light and heat as greedily as they do the sun's rays.

For five hours this process of enforced growth goes on, when the lights are dimmed and the plants permitted to snatch a bit of rest before the sun comes out to start them working again.

Carnations, lillies, poppies, dahlias, asters and roses respond to this treatment. If the sun hides for a day or two the electrics are subtituted. Vegetables can be transplanted from the seed weeks before the sun usually attains sufficient warmth to keep them alive, and their maturity is correspondingly early.

Flowering plants under artificial light bloomed approximately eight days earlier than plants grown under the sunlight only.

The chemical tests of the flowering plants and vegetable seedlings contained approximately the same amount of chlorophyll in both the plants under the lamps and those raised under sunlight only.

The economic value of this experiment to commercial growers depends upon cost of engineering the project and in maintaining the installation at maximum efficiency to bring the evident effect of the artificial light on production.

The results on such plants as Boston fern, calla lillies, rose geraniums and others which are in much demand by florists were extremely favorable. In almost every case the plants grew taller, continued to bloom longer and were

> sturdier than those that did not receive the benefit of the artificial light."

Over ten years ago Redfield and Bright of Harvard Medical School found that seeds which had been exposed to the action of radium rays grew far more rapidly than seeds not so treated, producing far more carbonic acid gas thus showing increased metabolic action.

The extensive experiments of Professor Rusby of Columbia, in stimulating the growth of plants with radium rays, is too well known to recount in detail. His findings far exceed those obtained by the experiments with electric light. Acres on acres of vegetables were planted by Professor Rusby and the plants that received the added stimulus of radioactive radiation grew often twice as rapidly as those that depended upon the sunlight alone.

Dr. C. Stuart Gager, director of the Brooklyn Botanic Gardens, announced recently:

> "It was found that by exposing the young fruit pods of the Jimson weed to radioactive rays for 10 minutes seeds developed which produced many new types."

M. Stoklasa finds that the radium rays that penetrate the chlorophyll cells transform the carbonic acid into formic acid, oxygen and carbonates.

Dr. Little of the University of Maine (now of Michigan) and Professor Bovie of Harvard Medical School have demonstrated the effect of radiation on chickens, curing them of disease and increasing egg production, due to the acceleration of the chemistry.

The London Medical Research Council recently announced:

> "Physiologists are active in analyzing the actions of light upon the body, which empirical observations have shown to possess curative powers that are so surprising but so little understood. Investigations have been carried

out with respect to the effects of exposing the skin of man and of animals to ultra violet light and other forms of radiant energy. Rays from the carbon arc or the mercury vapor lamp, as well as certain heat rays, were found to raise the bactericidal efficiency of the subject's blood. A similar improvement in the blood was found to come from exposure to the Alpine sun in the Winter. It was suggested that this enhanced power of the blood to kill microbes played an important part in the beneficial action of sunlight upon tuberculosis and other infections."

Hans Hobert discovered that the red blood count and hemoglobin value are reduced in normal white mice when the mice are kept in the dark. Blood regeneration is very slow in acutely anemic mice that are kept in the dark. These mice frequently die. When exposed to daylight, the anemic mice recover completely within 13 to 14 days. A careful irradiation with ultra-violet light leads to a rapid regeneration of the erythrocytes in 10 to 11 days. The hemoglobin value rises more rapidly than the blood count.

Cramer and Drew recently reported that radiation is a stimulus to the formation of blood platelets and delays the development of bacterial infection.

Susuki found that pigeons fed polished rice showed a low blood count after three weeks, but that under radiation for a week the blood count was markedly increased.

Dr. Steenbock of the University of Wisconsin announced in "Science" that vitamin-deficient food materials were activated by radiation.

A favorite experiment at the Bailey Laboratories is to place two bulbs in the dark. One bulb has a radium tube placed nearby or radioactive water is placed in the bowl while the other bulb receives no radiation. The latter bulb always moulds and rots in a short time, while the bulb receiving the rays grows strong and comes to full bloom in absolute darkness.

Delas and others reported experiments in 1924 where the eggs of certain birds were hatched in 23 days under radiation while the normal time is 32 days. *By immersing seeds in radioactive water the plants were developed nearly twice as rapidly as those not so treated.*

Slosson reported in the "New York World" Dec. 29, 1924 the meeting of the American Association for the Advancement of Science, and stated:

> "Those short, ultra-violet waves that burn or tan our skin will kill bacteria, and it recently has been found that taken in moderate amounts they may increase resistance to bacterial infection and stimulate various bodily processes in men and animals. They may cure tuberculosis, sores, and swellings They assist somehow in developing lime in the bones and so prevent rickets. To prevent children from becoming bow-legged it has been the custom to give them doses of cod liver oil, but it has now been found that a daily dose of sunshine will do as well.
>
> Steenbock of Wisconsin recently has found that hogs kept in the shade and fed on inadequate diet will become crippled in the legs, but they thrive on the same diet if permitted a place in the sun. Egg-laying, like bone-making, requires lime-using. So we are not surprised to learn, although we had not thought of it before, that these short waves will aid the hen in her duties.
>
> Hughes and Payne of Manhattan, Kan. have found that hens exposed once a day for ten minutes to an electric lamp source of ultra-violet rays laid four times as many eggs as those which did not have the light treatment. The eggs from the irradiated hens had thicker shells, contained more lime and twice as many of them hatched.
>
> The effect of the ultra-violet rays on the skin

affects the whole body. Exposing the left wrist to the rays will cure rickets in the right wrist as well, so it seems that the rays must activate some substance in the skin which carries the healing virtue throughout the system."

Speaking of the work of Dr. Antonio Pais in curing 5000 cases of chronic malaria by rays, the "Literary Digest" stated recently:

"The effect is due to the stimulation of certain organs in the body itself, especially the spleen, causing an increased activity of forces whose normal function is to protect the body by aiding it to throw off infection."

Were I to attempt to report the tremendous amount of work done on plants, animals, etc., with rays it would require hundreds of large volumes. The use of rays and their effects on the organism have been studied by scientists the world over for years.

The exact physical actions that take place when the rays come in contact with a cell is known as *ionization*. Everything as you know is composed of atoms, while atoms are made up of a number of smaller parts. Where a ray strikes an atom it knocks off one of its electrons and this is called a negative ion. The balance of the atom is a positive ion. Where a great many ions are thus created the substance radiated is said to be ionized and the electrical situation so produced is ionization. You see an example of this in your radio vacuum tube. The heat rays from the filament strike the atoms of gas in the tube, knocking off electrons and ionizing the space within the tube. Where there is ionization there is action.

One effect of ionization on a cell is to make it more permeable—to open it up—and thus increase its activity. In commenting upon this Dr. MacDougal of the Carnegie Institute recently stated:

"It is significant that scientific research in such apparently widely separated fields as physiology, chemistry and astronomy depends in all fields alike upon the correctness of our conceptions of the fundamental constitution of the atom. Thus the physiologist finds that some of his most important problems at the present time are included in the subject of permeability—that is, the manner in which particles or ions of substances pass into the cells from the outside, and the manner in which they travel from one cell to another.

These processes are known to depend upon the nature of the membranes or separating partitions, or the electrifications of the elements which compose them, on the one hand, and on the other hand, upon the mobility and electric charge of the particles themselves. Much of the complexity of the process is due to the fact that the character of the partitions or membrane is modified by the action of the ions which pass through them."

Recently Dr. Mills, the well-known author of scientific books declared:

"Our biochemists and biophysicists should be expected to make applications of atomic researches to the investigation and control of physiological and psychological processes."

The call of the scientist has been answered by the scientist. Rays have been brought to use for man's benefit in a definite practical manner, making use of our knowledge of atoms, electrons, ions, cell permeability and all the other recent advances.

That rays have an immediate and definite effect upon the cells of the body was recently demonstrated before 2500 members of the Clinical Congress of the American

College of Surgeons at the Rockefeller Institute by Dr. James B. Murphy, who explained how various types of short rays acting on the cell produced a protective substance which gave the body an immunity to man's most pernicious enemies. He showed how cancer cells in laboratory animals subjected to rays did not grow, while the same cells in animals or humans without such protection grew rapidly. Dr. Hyman of Stockholm, Sweden, stated at this meeting:

> "Specialists working in these fields everywhere are now convinced that ray activity powerfully stimulates healthy cells to combat disease. Under these beams youth dances through the blood vessels. The armies of red corpuscles increase and multiply by the hundreds of thousands. New life and energy is brought about by a process which may be called a transmutation of electronic energy into physical and mental force.
>
> The salts of fermentation collecting in the blood streams, giving hardening of the arteries (arteriosclerosis) and collecting in joints and capillaries causing muscular rheumatism, are re-distributed or excreted until the normal balance of the youthful organism is secured. Nephritis, Bright's disease and arthritis deformans have melted away under the all-searching beams of rays, because the process involved is apparently the very process by which life itself is made to live and multiply under the conditions existent on this planet."

Professor Dawson Turner at a recent meeting of the British Association for the advancement of Science made the surprising statement that by treating frog's eggs with radium he had bred frogs three times their natural size. He states:

> "The process applied to the frogs could be adapted to all food animals, including those

which supply us with food staples. A steer three times the normal size will certainly represent a very great economy in the production of beef. We calculate that the cost of such an enlarged steer would be but one-third of the cost of a normal steer. There would be greater economy in feeding one animal than three, besides a saving of time.

Equally, a field of wheat bearing heads three times the present size, would occupy the same space and the cost of planting and harvesting would be less. It follows, of course, that a man or woman with three times the present mental and muscular strength would make for a change in the world's progress."

The results of these experiments are described as "amazing and terrifying". The radiumized frogs and mammals showed an increase of intelligence and teachability that opened a vast field of speculation on the future possibilities. Radium not only confined its work to producing better muscles, bones, blood, etc., but actuated also the whole nerve system and the brain.

Similar experiments and results have been obtained by Professor Roux, of the Pasteur Institute, Paris; Professor Butler Burke of Cambridge University, and others. These men inserted a radium tube in a plot planted with oats, together with another plot without radium. In four days the radiumized oat field showed the plants three times higher than the normal plants, also stronger and more vigorous. When the normal field also received a radium tube, the plants quickly shot upward in the same way.

CHAPTER XVIII

USING RAYS TO STIMULATE THE ENDOCRINE GLANDS

I STATED that radioactivity represented the third method of rejuvenescence and now we will get a clear picture of this new development. We have already considered in the previous chapter the effects of radiations of various kinds on plant and animal life, and their use in increasing chemistry processes. This rapidly growing science of radiations or rays in chemistry is not only one of the most fascinating but also one of the greatest developments in a century. The future possibilities with rays are beyond the imagination of any of us to-day.

Rays are obtained from many sources, as we have seen. The sun and electric light are the most common, of course. X-rays are familiar to most people. But the most valuable source of rays is found in radioactive elements. It is one of the greatest of Nature's mysteries, in that there arises from apparently lifeless matter a type of rays that far exceed those from any other sources.

In the earth are found two metals. One is radium the other is mesothorium. To hold a little of either one in your hand you would observe no difference between these specimens and any specimen of silver or other metal, but from them arise billions of invisible penetrating rays that have been harnessed to serve the purpose of mankind.

Every school boy to-day knows that all elements are composed of tiny atoms and that these atoms themselves are made up of still smaller parts called electrons, which travel around in the atom billions of times a second. This terrific speed holds the atoms together or else everything on earth would disintegrate. In the

case of radium and mesothorium, however, something takes place in this swirling mass we call the atom that results in a real explosion of the atom, and the electrons, that are travelling at this terrific speed, are ejected and fly off into space. These we call *rays*. Even the tiniest amount of radium or mesothorium is composed of billions of atoms and every second millions of them explode or disintegrate with the utmost precision, thus giving off a stream of rays that are alike in their intensity hour after hour and year after year.

These radioactive rays are of three kinds. It is important that you note this carefully. The Alpha ray is called a ray, but it is a part of the atom itself and a comparatively large part. It is shot forth from the atom at a velocity of 12,000 miles a second. This is many times faster than the speed of the swiftest moving object we know—a shooting star. The Beta ray is also a part of the atom, but is 2000 times smaller than the Alpha ray and attains a velocity of 180,000 miles a second. The Gamma ray is not a portion of the atom but it is an ether vibration like the sun rays, the X-ray, radio waves, etc., and travels at a velocity of 180,000 miles a second.

All of these rays—the Alpha, Beta and Gamma—can create ions. The subject of ions I have explained in the previous chapter. However, the Alpha ray being larger in bulk than any Ether wave or ray naturally strikes more atoms on its travel through the air or through any matter. Thus it is said to be a good ionizer But because of its large bulk it cannot penetrate matter to any depth. The bare fraction of an inch of any material stops it and about three inches in air is as far as it will travel. The Beta ray is smaller and therefore does not strike so many atoms in its travel. Therefore, it is not so good an ionizer as the Alpha ray, but it will penetrate much more readily. The Gamma ray has the least ionizing power of the three rays but it can penetrate the human body or even a foot of iron with the greatest of ease.

The Gamma ray is the most penetrating ray known to science to-day.

Thus with radium and mesothorium we have a means of producing three distinct types of rays at will and in any quantity desired. From an infinitesimal speck of matter we are able to utilize rays from the most highly ionizing to the most deeply penetrating. Thus an expert in handling rays and in knowing what each may do in effecting chemistry change has at his disposal in these radioactive elements a means of treatment that surpasses anything heretofore known to man. The various methods of using rays to promote chemistry activity, as described in the previous chapter, can be substituted by these newer producing elements.

Bailey took advantage of these means that Nature has placed at the disposal of man and applied them in a highly scientific manner to rejuvenation. He did not discover either radium or mesothorium. He correlated the knowledge science possessed on radioactive rays with the knowledge existent and his own researches on the endocrine glands and developed a method that has been regarded by leading men everywhere as the nearest yet to true rejuvenescence.

Bailey used two methods. His earliest work was with the Gamma ray which he applied directly to the stimulation of the endocrine glands. By increasing the ionization in these glands with Gamma rays he increased the production of hormones by the cells of the endocrines. Bailey was the first man in the world to apply the principle of radioactive ionization of the endocrine glands. Just as the sunshine pours its rays upon a plant and ionizes it to effect chemistry action, so the Gamma rays were made to pour upon the endocrine glands to restore old or lazy cells to new vigor and life.

For this purpose the radioactive material is specially prepared in sulphate form and disposed upon a small plate that is screened off. This is called a *Gamma ray applicator*. By placing it on the outside of the body against the skin and over any glands that are deficient

the Gamma rays penetrate the body into the glands where the ionization effected awakens the glandular structures to new activity. This method of endocrine gland treatment has been described in newspapers, magazines and books during the past three years. I have used it extensively.

In order, however, to make the lipoid membrane of the cells more permeable and to insure the stimulation of the substance of the hormones as well as stimulating the endocrine glands themselves, Bailey decided to take advantage of the tremendous ionizing powers of the Alpha ray. This could only be done by applying the rays internally. The Alpha ray as I have stated has very little penetrating power, so that in order to place these rays in the body where they could produce their intensive ionization results it was necessary to administer the radioactive elements in the form of a solution known as "radium water".

For many years it had been the custom in medical practice, especially in Europe, to dissolve radium or radium emanation in water and have the patient drink this water. The generally accepted name for all such radioactive water is "radium water". I will describe radium water in detail in a later chapter, but for the present let me say that the object of the radium water treatment was to introduce radioactive products into the system to permit the Alpha rays to act upon the cellular structures. This method of treatment was used by Bailey for many years and the results he obtained with it have been confirmed by scores of the leading workers in this field everywhere, as we shall see in the next chapter.

However, Bailey found that the use of radium or radium emanation (Radon) alone was not entirely satisfactory and did not give the desired effect on the endocrine glands, although splendid results were obtained in many conditions. The chief objection was that radium did not permit the full use of the Alpha rays. He, therefore, found it necessary to perfect a means of

internal radioactive treatment that would not only be less expensive than radium, and thus available to all in proper therapeutic dosage, but which was also capable of producing the greatest possible Alpha ray efficiency.

As a result of his researches with radioactive elements Bailey discovered that the element mesothorium, which is 250 times more active than radium weight for weight, has a special affinity for the endocrine glands. This has been confirmed by many authorities. He found that by a special combination of mesothorium and radium he was able to produce a radium water that met every test. This product is now known in medical circles in this country and abroad as *Radithor*.

Radithor is a liquid. It is put up in small bottles. In each bottle is found the concentrated elements of both radium and mesothorium in a high state of solubility. By simply drinking this water the radioactive elements in same are largely absorbed from the stomach and intestinal tract, enter the blood stream and are carried throughout the entir ebody. The endocrine glands greedily attract these elements and the millions of tiny Alpha rays are brought into direct contact with the cells of the glands. Thus we get a very prompt general glandular stimulation. The radioactive elements likewise commingle with the hormones or secretions of the glands permitting the Alpha rays to exert a tremendous degree of catalyzing power.

In addition to this the Alpha rays are also brought into direct contact with *every* cell of *every* organ of the body, thus rendering the cells more permeable to the entrance of the hormones and increasing their cellular activity or metabolic functioning to a considerable degree. This is definitely proven by the fact that a single drop of blood or even perspiration will be found to be radioactive after taking Radithor.

Thus the use of Radithor is comparable to permitting streams of sunshine to play upon the glands and the cells.

All that I have written in the previous chapter on the

effects of rays of various kinds and the startling results obtained by leading scientists everywhere may be applied to Radithor, for the rays from this product, when taken into the body, give identical results with those secured by the ultra-violet and other rays. In fact, there is no ray known to science to-day that is in any way comparable with the tremendous catalyzing effect that is obtained from the Alpha ray liberated from Radithor.

This is very plainly shown when we examine the cells themselves. When we find cells that are sluggish the Golgi network (which I described in the chapter of the Mysteries of the Living Cell) hugs the nucleus, but after the use of Radithor the Golgi network spreads out remarkably, showing a considerable degree of cellular activation and vitality that it did not formerly possess.

Under this treatment the endocrine glands take on a new lease of life. Sluggish cells awaken to a new springtime of youth, increased streams of hormones, themselves highly ionized by the rays, pour forth into the blood, and the body cells receive them joyfully because they too have been rendered more permeable through the action of the rays.

The results obtained in my medical practice with Radithor were impossible when I used simply radium alone, or radium emanation. Cases that I had treated with only fair success with radium emanation were suddenly transformed when I placed them on Radithor. The effect was nothing short of startling. So skilfully had Bailey combined these radioactive elements into Radithor that I was amazed and dumbfounded at the results I obtained consistently through its use. The highly technical processes employed in the production of Radithor cannot be described here even were I familiar with each detail. I do know, however, that it represents the most effective method known to science to-day of introducing rays within the system.

And yet there is no necromancy about it. As I have previously stated, the method that Bailey developed seems simple in the extreme. Just a tiny bottle of appar-

ently lifeless, colorless and tasteless water is all that the eye sees or the tongue can detect and yet in that tiny bottle there reposes the greatest force known to mankind. A drink of this radium water from the Bailey Laboratories and immediately the whole body is flooded with billions upon billions of Alpha rays that liberate their energy throughout the entire system like floods of sunshine, reaching every cell, every gland and every nook and corner of the body to revivify and quicken to action every fibre and tissue of the organism.

Is it any wonder that I wax enthusiastic over this marvellous contribution of Bailey to mankind. In fact, I fear that words fail me in giving full expression to my feelings with respect to this new weapon of medical science that has been forged by a master craftsman for the regeneration of man and woman.

CHAPTER XIX

CLINICAL EVIDENCE GALORE

On what definite scientific and clinical facts are the rejuvenating claims for Radithor based? Let us examine the evidence.

Some time ago Professor Zwaardemaker of Zurich experimented to learn the function of potassium in our bodies. Potassium is radioactive like radium and mesothorium, only so feebly that it does not compare with either of these two. It is millions of times less active. Yet Zwaardemaker believed that there must be some vital reason for our having a radioactive element in our system. He, therefore, succeeded in extracting the potassium from the blood of animals, and found that the heart stopped beating. On replacing the potassium the heart started beating again. Further experiments showed that he could put a very small amount of mesothorium or radium in the blood and the heart started beating once more. It thus became evident that some form of radioactivity was absolutely necessary to the maintenance of the process we call "life".

Ellinger has done extensive work also in influencing the oxidation of red blood corpuscles by potassium. He came to the conclusion that the presence of radioactivity in the body is absolutely essential for the oxygen respiration of the blood cells. When the amount of potassium falls off the oxidation power decreases rapidly. An increase in potassium raises it.

It is a well-known fact that the potassium content of the body is decreased when one has cancer and in old age generally—unless it be a virile old age. It has been a well-known saying for years that "there is no life

without potassium". To-day scientific research has shown us that it is because potassium is radioactive.

Fischer in Germany found that where plant growth was deficient normal growth is obtained by increase in potassium. The use of potassium (potash) in agriculture is world-wide. Another German discovered that a definite amount of potassium in a plant maintains the protoplasm in such a condition that maximum growth takes place, while with too little potassium the consistency of the protoplasm is unfavorable to growth.

Albert Nodon recently announced in France that living vegetable and animal organisms are the seat of a radioactivity which appears to be a function of the degree of vitality of these organisms. Dead organisms on the contrary exhibit no appreciable radioactivity.

As long ago as 1835 Burckhardt-Eble came to the conclusion that the splendid therapeutic results obtained at Gastein and other Spas were not dependent upon the mineral contents of these waters, for the very evident reason that they had no minerals in them. He then made the statement that "the waters contain a gas, the existence and classification of which will in due time be discovered and recognized as the acting substance."

It had also been repeatedly observed that of two springs possessing identically the same chemical analysis one would show remarkable therapeutic properties while the other was of little curative value.

Many springs which gave most unusual results in the treatment of various ailments were found to contain no unusual chemical constituents that could account for their therapeutic value. In fact an analysis of many of the most famous curative waters will be found to be identical with that of ordinary city tap water.

Another early observation of interest was that the waters of these springs must be used as they came from the springs. When bottled and shipped away they lost their virtues. To account for this the theory was put forward that the real benefits accrued from the rest, diet and other benefits of these well-regulated Spas.

But with the same medical supervision, diet and rest given elsewhere the results were not duplicated.

It became quite popular (and still has a vogue) to evaporate the salts from these springs and ship them at considerable distances to enable one to make up their own mineral waters for drinking or for baths. But these have been shown to be quite lacking in therapeutic value.

No satisfactory explanation for the phenomena was forthcoming until the discovery of radioactivity. Then measurements were taken and it was found that these waters were radioactive—either contained radon (radium emanation) or thoron or the various radioactive elements themselves. For the most part they simply contained the two gases—radon or thoron.

On this basis a very ready explanation could now be given of the many problems that beset scientists in their study of the natural mineral waters. It became evident that Burckhardt-Eble made a good guess. Radon decays to one half in 3.85 days and is practically all gone in one month. Therefore, when the waters are bottled and shipped away the radon or emanation disappears. Then again if the waters are evaporated and the salts shipped away it is evident that in the drying process the radon or emanation has been driven off. An examination of springs of identical chemical analysis showed that those of undoubted therapeutic value contained this radium emanation while the others did not.

Science could come to only one conclusion, and that was that the real value of these springs lay in their radioactivity and could be attributed to nothing else. This opinion was voiced by numerous leading authorities of Europe many years ago and formed the starting point of internal radioactive treatment. Thus the scientific application of radioactivity to therapeutics has a historical basis of support in the fame of certain springs centuries old that have now been shown to depend for their healing qualities on the presence of radioactivity. Even the red men worshipped the "spirit of the Springs"

and travelled hundreds of miles with their sick and aged to be restored to health and youth.

Once it was determined that radioactivity was responsible for the beneficial results of the springs numerous investigators undertook to give systematized treatment with the radioactive elements themselves and on the basis of their findings there was inaugurated the internal therapy described in this chapter.

It is plain where the springs get their radioactivity. There is radium in all rocks, soils, etc. Thus the waters in passing through the ground readily absorb the emanation from the radium substances. The greater the amount of radium in the vicinity of these waters the greater the amount of radon and thoron in the waters.

Natural waters may contain either the gas only or the elements themselves. Where only the emanation is in the water this will disappear in a month completely and thus the water is then of no therapeutic value. It is evident therefore that bottled waters said to contain emanation when bottled certainly contain none after a month. Very few waters contain the real element. It is true that some waters manage to absorb a little element and thus they are permanently radioactive. But there are very few springs of this kind.

In most of the famous watering places in Europe the physicians began augmenting the radium of the waters by additional treatment with radioactive elements. This practice is being carried out in Japan, South America and other parts of the world. Only at Saratoga in this country has much been done in this regard, where Moriata has reported favorably on his work. Special attention has been stressed in all these places on the baths as well as the drinking cure.

The famous resort in England—Bath—has been highly regarded for many centuries. Sir Wm. Ramsay and Professor Soddy investigated the springs at this place and found them highly radioactive. Since then the latest methods have been employed and the treat-

ment has developed to a very high degree, with surprising curative results.

It may be of interest to note the various conditions for which the natural mineral waters containing radioactivity are recommended. Professor Ernest Sommer of Zurich recommends them in Anemia, chlorosis and allied blood diseases; Arteriosclerosis; Bacterial infections; Arthritis, subacute, chronic and deformans; Infections of the nose and adjoining sinuses; Heart affections, myocarditis; Joint diseases of rheumatic origin, subacute or chronic; Gout, uric acid diathesis; Skin diseases (eczema, psoriasis, etc.); Chronic exudative conditions, such as empyema, plastic pleurisy, perimetritis; Sciatica; Catarrhal conditions of the air passages; Diseases of the lymphatic system; Spleen, enlarged glands due to scrofula; Chronic diseases of the bone; Cancer of the stomach; Chronic myocarditis; Tumors; Chronic neuritis; To absorb the exudates of apoplexy and vicious bone unions and operative scars; To aid in building up the tissue in convalescence; To encourage tissue change in corpulency or diabetes; Tabes dorsalis; Dysmenorrhea, uterine diseases, para- and peri-metritis.

Physicians who have had practical work at the Spas for years have been unstinted in their praise of this method of treatment and feel that too little has been done in this country in this great field. Yet we find the U. S. Government rather enthusiastic over the splendid results at Hot Springs. Glowing statements will be found in two pamphlets issued by the Government—one by the Department of the Interior and the other by the U. S. R. R. Administration. The latter states:

> "Within recent years radium has become known as a powerful healing agent. Many cases formerly considered hopelessly incurable have yielded readily to its activity. The waters (at Hot Springs) are radioactive, and more than ninety per cent of those who have taken a

full course have been either cured or benefitted."

The former states:

"The waters may be reasonably expected to give relief in the following conditions—gout, rheumatism, neuralgia, chronic Bright's disease, catarrhal conditions of the bladder sterility, chronic malaria, many chronic skin diseases, some forms of cardiovascular diseases with increased tension in the blood vessels. The general tonic and recuperative effects are marked in conditions of debility and neurasthenia."

In considering the curative effects at the various Spas we must bear in mind that the amount of radioactivity in most cases is very small per litre. Only in a few springs has the radium content been found to be very large. The treatment at most springs consists chiefly in drinking and in the baths. When one drinks the water one takes into the system the radium gas which disseminates throughout the body, and, by disintegrating, releases radium A, B, and C.

While excellent results were obtained at the springs, yet it was not always convenient for patients to go there and remain the proper period of time, so the practice was instituted by physicians of giving the same type of treatment at points far removed from the springs. As radioactivity was the principal ingredient desired this was obtained and administered in the form of radium water.

Large clinics for this work were established in Germany and other countries where thousands of patients have been treated. Thus the use of radium water has been a well established form of treatment for many years. As a result of this extensive use of radium water in Europe a large amount of clinical evidence was obtained based on actual experience. While the monumental books of Lazarus and Falta cover much

of the work, yet more than 3000 articles and books have been published on the splendid results obtained with radium water treatment.

I am going to give below a brief summary of the clinical reports as taken from this literature regarding radium water treatment. This array of facts on the biological and physiological effects produced with radium water that have been presented in the leading medical magazines and books by a large number of well-known doctors confirms in every respect the findings obtained by Bailey.

Activates Ferments. It activates the glycolytic, urolytic, peptic, diastatic, autolytic, pancreatic and lactic acid ferments.

Metabolism. It is a wonderful synergist to metabolism, carrying a normalizing activity to the tissues, fluids, protoplasma and nuclei. The physiological manifestations of radium water center around its effects upon metabolism and the blood. It increases nitrogenous metabolism. It favors tissue oxidation and improves general metabolism. It activates purin and protein metabolism. Carbohydrates are mobilized and oxidized in increased quantities.

Digestive Processes. It has a very pronounced action in catalysis and intensifies the fermentative and digestive processes. It excites and increases the hyperemic condition of the glands in the digestive tract. It increases fluid secretions and materially hastens normal digestion and assimilation.

Excretion. Uric acid excretion is increased to a remarkable degree. There is an increase in the ethereal sulphur output as well as in the rate of creatinin and purin excretion. A general increased diuresis is always evident.

Respiration. There is an acceleration and increase in respiration, readily noted in cardiac

dyspnea. Carbon dioxide is exhaled in increasing amounts.

Eliminatory. All eliminatory functions are activated. It improves the muscle tone of the intestine and fosters normal peristaltic action.

Arteriosclerosis. Radium water appears to cause the reabsorption of the salts which tend to collect in persons of advancing age. The arteries are made more elastic.

Hypertension. It reduces blood pressure by its action in dilating the blood vessels through the excitation of the vasomotor nerves and by diminishing the viscosity of the blood. Radium water may be placed in the forefront of therapeutic measures for the relief of hypertension. Authorities are practically unanimous as to the success obtained with many of those diseases of the cardiovascular system that come under the terminology of high blood pressure, apoplexy, senile decay, etc. In almost 90% of the cases certain improvements promptly occur. Precordial distress, headache and vertigo disappear—the general energy of the heart is improved and peripheral resistance is reduced. Radium water improves the general muscle tone of the entire vascular system.

Blood. It is a hematenic. Patients consistently look and feel better. There is frequently a transient leucocytosis within a few days with a return to normal soon thereafter. There is frequently a diminution of the erythrocytes but soon thereafter a marked increase in the red blood cells as well as an increase in the hemoglobin. This has been especially noted in secondary anemia. The red blood cells have often increased from 100,000 to 1,000,000 within a few days.

General. It is a prompt aphrodisiac, greatly increasing sexual activity.

It revitalizes organic matter and as such is a super-stimulant, yet it is a powerful sedative and hypnotic.

Its action in rheumatism and neuritis is found to be through its attacking inflammatory conditions and by promoting absorption and excretion. It relieves the soreness in the joints and muscles as well as the sharp pains of neuritis, gout, tabes, etc.

In diabetes there is an increase in weight, a decrease in sugar, increased oxidation and carbon dioxide exhalation.

In glycosuria a complete disappearance of sugar.

In albuminuria a lowered blood pressure and increased excretion of toxins by the kidneys and lungs as well as a decrease in albumen.

In gout a disappearance of uric acid and crystals in urine. A general increase of volume of urine and a decrease in pain, stiffness and swelling.

Regeneration. There is an immediate feeling of "bien etre" after taking radium water. The The whole body at once feels the influence in a very gratifying manner. The mental faculties are improved. One soon becomes conscious of a feeling of well-being with a prompt sedative effect upon the nervous system. It gives a sense of buoyancy and instills a feeling of renewed youth with extreme physical freshness and increased bodily activity.

The Prince of Monaco discovered that the sea contained large amounts of radium and mesothorium and that the sea air is charged with radioactivity. This is said to be the whole secret of that renewed, strong pulse of life that is given people who visit the seashore.

Armstrong of England treated 10,000 cases with radium water and reported his results as follows:

In Diabetes: Decrease of sugar. Increase of body weight, oxidation, carbonic acid exhalation, and great improvement in general health.

In Glycosuria: Rapid decrease and eventually almost always the complete disappearance of sugar.

In Albuminuria: Decrease of albumen and blood pressure. Increased excretion of body toxins by kidney and lungs. Decided improvement in general health.

In Arteriosclerosis: Marked decrease of blood pressure from 20 to 80 mm.

In Gout: Increase of volume of urine and of uric acid excretion. Disappearance of uric acid crystals in urine, rapid decrease of pain, stiffness, and swelling of affected parts.

In Rheumatism: Decrease of pain and stiffness.

In Neuritis: Diminution of pain. Great improvement in nerve health generally.

In Arthritis: Improvement in nearly all forms, in recent non-acute cases very rapid changes were observed.

In Neurasthenia, with autointoxication and loss of vitality: These cases improved with extraordinary rapidity and completeness. Marked change in appearance and vitality. Considerable increase in carbonic acid exhaled. The cases in this group were most satisfactory of all.

Loss of Sexual Vitality: Some dozen cases treated especially for this, all with good results; in a number of other cases information regarding this improvement was volunteered.

Sympathetic Nerve Affections: Especially

vasomotor troubles, such as angioneurosis, made very satisfactory progress."

In an article in the "New York World" Jan. 14, 1923, Dr. F. H. Glazebrook stated:

"Sooner or later, those who will take the trouble to observe for a short time the action of radium water upon the chemistry, physiology and metabolism (representing all the constructive as well as the destructive forces of the body) will find themselves amazed by some almost miraculous effect. I myself have seen the blood cells and hemoglobin (color of the blood) increase in a few days by as much as 20 per cent, where all other measures had failed, blood pressure, the 'Red Flag' of the onset of old age, manifesting itself in the hardening of the arteries and diseases of the heart and kidneys, reduced as much as sixty to seventy degrees and the accompanying discomforts relieved, stiff joints in arthritis deformans lessen and the pain relieved, debility of old age replaced by activity and well-being."

In "Medical Life" in a recent symposium on radium a compilation of cases treated with radium water as reported by many leading authorities will be found of great interest. I am giving this list on following page:

	Cases Treated	Cured	Benefited
Anemia	111	71	40
Ankylosis	52	30	21
Arteriosclerosis and High Blood Pressure	399	70	316
Arthritis, Chronic	225	186	38
Arthritis, Deformans	1403	541	496
Arthritis, Gonorrhoeal	50	30	17
Arthritis (Gouty)	250	78	124
Arthritis, Acute Rheumatic	110	54	36
Arthritis, Subacute Rheumatic	120	106	10
Arthritis, Subacute	213	139	64
Bronchitis	167	83	56
Eczemas	59	22	15
Gout, Acute	52	—	42
Gout, Uric Acid Diathesis	556	128	376
Migraine	28	9	17
Myocarditis	181	—	168
Nephritis, Chronic	154	—	147
Nephritis, Interstitial	88	—	53
Neuralgia and Neuritis	372	153	181
Neurasthenia	387	225	145
Polyarthritis	485	194	233
Polyarthritis—Chronic Rheumatic	153	122	16
Psoriasis	33	4	22
Rheumatism, Chronic Articular	872	362	403
Rheumatism, Subacute and Chr. Musc.	240	116	122
Rheumatism, Muscular	611	347	195
Sciatica	483	292	130
Total	7854	3362	3483

Professor Barton Scammel, President of the Radium Research Society of England, wrote to the "Times" on August 1, 1922:

> "We all know that life is created, but what causes life to live? Recent discoveries point to the fact that the vital force which keeps the spark of life burning is 'radioactivity.' The discoverer of Radium, Mme. Curie, ascribed the vital heat of the earth to stores of radium in the interior of this planet.
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> Experiments on plant life with radioactivity showed remarkable results, and have recently been extended to human beings with equally

great success. Under the application of radioactive solutions men and women of advanced years have been restored to the vigor of healthy middle age, and rheumatoid arthritis, diabetes, neuritis, and similar disorders have been eliminated."

Adolph Koelsch, experimenting with radioactivity rejuvenated the butterfly. He also rejuvenated the cauliflower. In both instances a biochemical change is produced in the centers controlling the reproductive metabolism.

Dr. Moriarta in the "Medical Record" states:

"The physiological action of radium sounds not unlike a fairy tale. It often increases the red blood count ¼ of a million in 48 hours, and also the hemoglobin markedly in a short time. It stimulates all cell metabolism. It increases the elimination of carbon dioxide, urea, and uric acid, and in addition is said to keep the latter in solution in the blood. It diminishes the viscosity of the blood and greatly increases the quantity of urine secreted. It stimulates and increases the appetite, and aids digestion by activating the digestive ferments. It dilates the blood vessels, through the excitation of the vasomotor nerves. Its action in anemia is little short of marvelous, it relieves the pain and local manifestations of gout promptly and also the pains of neuritis. It lowers blood pressure almost so surely as you administer it. It is a prompt and powerful tonic and stimulant. Radium is certainly a valuable adjunct to the carrying forward of Nature's beneficient processes."

Dr. S. Sauberman, in a lecture before the Röntgen Society London, states:

"Increase of sexual activity: This is the direct

result of the demonstrable effect of radium on the sexual glands, but sometimes it is also an expression of the increased vitality of the whole organism produced by radium water treatment. When it occurs especially in cases of diabetes it is accompanied by a diminution of diacetic acid, a lessened excretion of sugar, and an increased tolerance for hydro-carbons and corresponding gain of body weight. As this effect of radium is rather curious I should add that several well known Continental Spas, such as Gastein, Baden-Baden, etc., which are now recognized to be strongly radioactive, have for a long time enjoyed a reputation of 'rejuvenating' waters, while the fact that the use of baths and water artificially rendered radioactive tends to produce the phenomenon in question has been confirmed by many distinguished and trustworthy physicians, including von Noorden who has drawn our attention to it in some of his papers."

Dr. Delano in the "Medical Record" states:

"Radium water from this standpoint may be looked upon as stimulating to the innumerable ferments of the body; as supplying a goad, so to speak, to the vital processes. A corollary to this would be that it ought to be an equalizer, tending to restore the balance of forces. Very interesting in this connection are the observations on the heart in Cases XXII and XXXVII. If these observations are correct then, while taking radium, one heart very obviously increased its dimensions while the other decreased—with a correspondence of collateral signs that was strongly corroborative. Granting that the fundamental effects of radium water are on metabolism, this would give it a very wide range of applicability with

which it seems proper to credit it; especially, it may be repeated, as it does not have the disturbing by-play of drugs."

Dr. Pais of Rome stated before the Gynecological Congress at Naples on May 7, 1925:

"Radium rays not only excite living cells but even produce the phenomenon of reversion—giving back to the cells their lost vitality."

Dr. Pais claimed to have obtained the true phenomenon of returned youth with radioactive rays, whereby vitality was immensely increased.

Following the great Pais come other leading men in this field with startling announcements. Under the heading, "Radium to Prolong Life" in December 1922 papers we read:

"There is new hope for the baldheaded, the toothless, and the decrepit. If they only can manage to hang on for another decade the hope is held out to them of which Ponce de Leon dreamed and for which Faustus dealt with Mephistopheles. Health, vigor and the fire of youth will be restored to them, wrinkled faces will be smoothed, bald heads grow new crops of hair and mouths will be equipped with their third set of teeth.

And it will not be done by the crude monkey gland method and kindred processes either. 'Radium' is the magic word that holds such promises for the future. These are the possibilities that are to result from the radioactive treatment that has passed the experimental stage and is now in practical use in Europe, according to Dr. C. Everett Field, director of the Radium Institute.

Dr. Field bases his assertions not only on his own knowledge of the subject, but upon facts

obtained by him from Prof. Barton Scammel, President of the British Radium Society, who proclaims the radioactive treatment an established success."

'I fully believe,' Dr. Field continued, 'that within another ten years the use of Radium Water to extend the period of life will be common.' "

Charles Wood in the "N. Y. World" December 10, 1923, gives us the following extracts of an interview with Dr. Field:

"If someone were to discover how to raise the dead, I should call it news. Or how to live 500 years. Or even how to remain in a state of vigorous youth up to seventy-five or eighty, instead of beginning to die at forty in the way most of us habitually do today. But if any such discovery were made, what could a newspaper man do about it? He would have to call up eminent members of the medical profession for their opinion, but he could just as well write out the opinion in full before making the call. The doctors would be sure to say that there was nothing in it. That is the thing, apparently, for a doctor to say in regard to any new departure in healing. There are so many fakes being floated, so many promises of sure cures that cannot be kept, that it is probably lucky for all of us that the doctors are inclined to take this skeptical stand. On the other hand, it is a little annoying to be told through the years that there is nothing in psychoanalysis, nothing in mental healing, nothing in hypnotism, nothing in a hundred other things that eventually turned out to be something, even if they weren't all that somebody hoped they were. Doubtless there was a time when there was nothing in

dentistry, nothing in surgery, nothing even in medicine—when the only sensible thing for a sick man to do was to get a barber to bleed him white.

I've got a hunch that there's something in radium, not merely in treatment of cancer but in internal therapy. I'm only a newspaper man, I'm not a physician, and I have no right to have any such hunches. But Dr. C. Everett Field, Director of the Radium Institute, recently returned from Europe, where he has been visiting hospitals in which radium was so applied, and he announces himself as startled at the almost miraculous results. Immediately several distinguished American authorities made the usual retort. In learned professional phraseology, they said there was nothing to it. But Dr. Field is a regular physician, a member of the Academy of Medicine and all that; and since he is at the head of an institution partly charitable, it could not be charged that he was unethical in permitting this publicity. When doctors fall out, I reflected, newspaper men get their duese. So I looked up Dr. Field.

'It isn't a question of controversy at all,' he said. 'It is a question of fact. Radium is a young science, to be sure, but it is old enough to permit certain definite observations. America happens to be about ten years behind Europe in the development of the science, that is all. Cases that would formerly have been looked upon as hopeless are now being given this internal treatment, and are not only helped but restored to perfect health. Bedridden rheumatics, sufferers from arthritis, whose bodies have been reduced to skin and bones, with muscles atrophied, and joints so stiff that movement is impossible, are now being restored to health and strength in such a percentage of cases that even

I was startled. And I believed in radium. I had occasion to know some of the wonders it was capable of achieving. I have never claimed that radium is a specific for any disease, but out of 300 cases classed generally as rheumatic, we have had only four absolute failures. On the other hand, some of our cases have recovered so extraordinarily that physicians have freely expressed their amazement.'

'Do you think actual rejunvenation is possible,' I asked. Do you think a worn out man of fifty or sixty may reasonably hope to recover his youth with all the vigor and all the joy that goes with twenty and twenty-five?'

'Not if he is worn out,' Dr. Field replied. 'But if he is merely broken down—perhaps. If metabolism has stopped simply because the waste matter of the cells has not been properly eliminated we can't say the man is worn out. He is simply clogged up with either quick or slow poison. Cases of wearing out, as I said, are very rare. If there is proper nourishment and perfect elimination, I say there is no telling what the span of human life might be. A single gland allowed to go wrong may deprive the brain of all intelligence. Substituting chemical injections, however beneficial the results, cannot be as good a solution of the problem as to get that gland working again on its own initiative. Trading glands with goats and monkeys may do all right if you haven't any of your own, but if your own are capable of rebuilding themselves it is poor economy to make any such trade. All that is necessary in any of these cases is that a perfectly normal process in some part of the body should be allowed to continue. Radium, a mysterious element which was discovered only twenty four years ago, is making this possible in thousands and thousands of

cases. This is news to which America is entitled. It is so startling that I do not wonder at its being discredited. But scarcely a day passes in these wonderful times when science does not reveal some unheard of wonder. It is not scientific, I maintain, in the face of the miracles which man is now performing in a thousand different fields, to assume that he cannot possibly learn anything much in the one line in which he is most interested—the constitution and prolongation of his own marvelous life.'"

Less than two years after making the above remarks Dr. Field made the statement that Radithor, developed by Bailey, was the "best means of internal radium therapy we have at present."

Let me give a few quotations from Dr. Fields's articles in leading medical journals regarding radium water:

"From the earliest experiments to the present, lowering of high blood pressure during radium water treatments has been the common report. Physiochemical processes are exact and the physiological and biological manifestations that follow must to a similar degree, be definite. Therefore, it is that, in almost 95 percent of the high blood pressure cases treated, certain improvements are promptly noted, precordial distress, headache, vertigo disappear at times even with small dosage. The general energy of the heart is markedly improved and peripheral resistance is reduced. The elasticity of the muscular wall of the artery relieves the heart of much unnecessary load. When the tonicity is low, increased tension results. Radium water improves the general muscle tone of the entire system."

"There is an opportunity of vast importance here waiting for the real research worker to pick

up the thread and trace the terminal activities and results as they may relate to the physiochemical properties of radium in catalysis and autolysis. Beyond giving treatment to the active case, we are now called upon to give attention to those measures of prevention which will enable those advancing to the fifth and sixth decade to grow old gracefully."

"Von Noorden, considering radium water, states: 'In contradistinction to all other forms of electro-therapy, we possess in the radioactive substances means of carrying electrical energy into the depths of the body and there subjecting the juices, protoplasm, and nuclei of the cells to an immediate bombardment by explosion of electrical atoms. We may, therefore, designate this internal treatment with radioactive substances as internal electrotherapy.'

In general, we may summarize the physiological and biochemical effects of radium water as (1) Activation of all eliminatory functions. (2) Stimulation of the autolytic processes. (3) Favors tissue oxidation and improves general metabolism. (4) Causes active diuresis. (5) Produces at times a startling change in the blood picture—enormously increasing the red count—at times temporary leucocytosis. (6) Reduces blood pressure. (7) Has anodyne and sedative qualities that are of great value. These properties naturally direct our attention to such indications for radium therapy as point to disordered metabolism. Most encouraging results will be noted in chronic rheumatism, early arthritis deformans, pains of gout, tabes, neuralgia, and neuritis. In these diseases classed as associated with cardiovascular-renal regenera-as associated with cardiovascular-renal regeneration some of the best clinical improvements are

noted. Radium water is decidedly a factor in checking the advance of the senile period. It fosters ebbing functions and permits the veteran of life to grow old gracefully."

Even great clinics like the Mayo clinic of Rochester, Minn., have used internal radioactive treatment (radium water). Dr. Stern of the Mayo clinic in a recent article on arthritis, gout, rheumatism, neuralgia, lumbago, etc., stated that the relief of pain in such conditions was a well-established fact.

The great Dr. Morton recently stated:

"It is entirely within the bounds of present clinical experience with radioactivity to get into healthy glandular function the entire system of glandular organs and tissue, thus rejuvenating the premature failing body."

From the famous Pasteur Institute of Paris we have reported, after extensive experience by Drs. Jaloustre and Fourcade, that

"Radioactivity stimulates and gives fighting material when there is cell life. It constitutes a cellular exciting agent of the first order. It vitalizes the cell.

This radioactivity produces leucocytosis, raising the resistance of the organism to attacks by microbes. Radioactivity besides is a bactericide by itself.

The poisons that we absorb each day, or that our organism is producing constantly, are being absorbed. In this case the radioactivity excites the activity of the endocrine glands and intensifies their antitoxic rôle. Besides, the oxydaxic properties of radioactivity are opposed to the decreasing efficiency of digestion and assist in more complete elimination of the products of disassimilation.

When the great producer of energy, the nervous system, is enfeebled, radioactivity is a stimulant for the activity of the nervous system."

Dr. F. E. Park in an article in the "New York Medical Journal" wrote:

"Judging from a two years large experience in this field I venture to predict that the day will come when it will be a customary thing, as middle age is reached, regularly to take a course of radium water treatment in order to revive and stimulate the functions of the whole body and put back by appreciable years the inevitable decline which we call old age.

As a general tonic after a severe sickness, I believe it is without a peer, for time and again I have been able to build up a surgical case that on account of general debility was apparently hopeless, so that in a very short time my patient was able to undergo a major operation successfully. Again I use it as a routine practice in the convalescence following all my severe surgical work.

Another class of disease where I employ it as a most satisfactory routine treatment, is neurasthenia, and every medical man can test this very nicely in his own experience. There are always times in our busy life when the work comes so fast that we are tired out, and it is hard to keep going. This is the condition that has steered so many of our profession into the use of alcoholic stimulants and drugs. The effect of the solution in this condition is simply magical, as I can testify from many personal experiences. In my own case I pass, in about twelve hours, from exhaustion to one of perfect well being, and this condition persists."

The well-known Dr. Charles G. Davis writing in the "American Journal of Clinical Medicine" in February, 1921, remarks:

> *"Radioactivity is the very essence of life. It promotes digestion, gives increased vigor to all nutritive processes, stimulates the intellectual faculties, prevents insanity, rouses noble emotions by promoting a healthy brain, retards the advance of old age and creates splendid, youthful and joyous life. It certainly is matter and yet it is life. What a wonderful illustration of concentrated power!"*

From the above few quotations my readers will appreciate that a mass of clinical evidence has been built up on the use of radium water that demonstrates its undoubted therapeutic value. One is not left to take the word of a single authority, no matter how sincere or capable he may be. We have our confirmation from leading doctors of England, France, Germany, Italy and other parts of the world as well as our own country. The evidence is at hand. It is full and complete and authenic.

CHAPTER XX

WHAT THE RAYS DO IN THE BODY

You recall I explained how Bailey showed that radium water not only increased the functioning power of the endocrine glands but also increased cell permeability. His findings have been confirmed by many scientists. Hober and Banus in Germany found that substances which may fail to penetrate cells will enter them when the cells are made permeable by ionization with radioactivity. Landecker found that under the influence of the rays gland extracts administered increased the functioning of the sex glands enormously. He stated that the rays from radium water increased the "organotropic" action of the gland substances and increased the production of hormones. Zondek and Reiter found that the reason that gland extracts did not produce always the results anticipated was that they needed a catalyzing agent (such as radium water) to bring out their specific chemical action.

The next step of importance to note is that scores of scientists confirmed Bailey's findings that radioactive elements had an affinity for the endocrine glands. Bouchard and Balthazard have done splendid work in proving the direct action of radium water on these glands. Wickham and Degrais found that radioactive substances have a predilection largely for the adrenal glands. Gudzet demonstrated that radium water increased the activity of the adrenals and fostered cell growth and cell regeneration.

In a review of the work done at the Radium Institute of Paris, as published in the "Paris Medical Journal" February 7, 1925, it was found that radioactivity had

a tremendous affinity for the sex glands and thymus as well as the adrenals and other glands. While a single drop of blood taken from any part of the system after a course in Radithor will show a high degree of radioactivity, yet autopsies on various animals invariably show a greater amount in the adrenals, sex glands, thyroid, spleen, etc., than elsewhere.

When one takes radium water the radioactive products are carried by the blood into direct contact with the cells. Here the tiny Alpha rays literally bombard the cells into increased activity. As I have previously explained, the action of the rays is known as ionization.

This ionizing action of the rays has a catalyzing effect—that is, makes chemistry changes without itself being affected. The rays make the cells more permeable and the whole effect is one of oxidation.

Any chemical change that takes place in the body cell under the influence of radiation is, of course, that of oxidation. The basis of all life processes is oxidation—an absorption of oxygen which sets up a series of chemical transformations constituting vital phenomena. Thus cellular activation is primarily an acceleration of the processes of oxidation. By stimulating oxidation absorption with radiation we intensify vital processes. The actual physical process, however, is atomic and molecular as a result of the ionization set up. An increase in the permeability of the cells naturally increases oxidation. It is interesting to note the marked changes in the Golgi apparatus soon after radium water treatment.

Dr. George Crile says that radiation effects are cell charge disturbances brought about by ionic bombardment.

Through the ionization effects of the Alpha rays on the glands and hence the increased oxidation there is an increased cellular activity which results in the production of a larger amount of the secretions. We also note a direct physical action of the rays through the breaking

down of insoluble deposits into readily excretable form.

A concrete example of the principle of the action of Alpha rays is found in the case of gout, an ailment that has heretofore largely resisted medical effort. In this condition there is a deposit of Monosodium Urate which is insoluble. The Alpha rays break this down into urea, oxygen, hydrogen, ammonia, etc., which are soluble and can be readily carried away by the blood.

The split protein theory is being put forward by many doctors as a result of their work with Radithor.

The rays also possess great bactericidal powers. One half a milligram will kill one million tuberculosis bacteria in a short time. One tenth of a milligram in the pus cavity of a tooth will render it absolutely sterile in a few hours.

The rays from radioactive substances have been compared to the ultra-violet rays in physiological action. Thus the use of radium water may be likened to the use of the ultra-violet ray within the body.

Radium water physiology is dependent upon its catalytic action. It controls or fosters chemical action without itself being changed. It has tremendous catalytic power. It hastens and stimulates all chemical processes with which it comes in contact.

Von Noorden states that we possess in radium water the means of carrying electrical energy into the tissues of the body and there subjecting the juices, protoplasma, and nucleus of the cells to a constant bombardment of Alpha rays.

When we introduce a definite force into the body in this manner we are certain to markedly influence biochemical processes. We can also place radium water in the category of natural and physical means as contradistinguished from drugs. Radium water serves its therapeutic purpose entirely through the liberation of electrons (Alpha rays), the bombardment from which activates the body's cells to favor normal functioning.

Rountree and Baetjer in the "Journal of the American Medical Association" state:

"The consensus of opinion is that the use of radium water is attended with an increased urinary uric acid output and that disappearance of deposits (tophi or artificial deposits) is hastened. Uric acid disappears from the blood under radium treatment and appropriate diet, and its disappearance is frequently associated with subjective improvement.

The work of Silbergleit and of Kikoji indicates that radium water has a definite and outspoken effect in increasing the volume of air breathed, the oxygen consumed and carbon dioxide expired, and in raising the respiratory quotient, and hence that it increases total metabolism."

Dr. Finzi in "Radium Therapeutics" states:

"Radium water acts by increasing the rapidity of tissue oxidization and by increasing the activity of all the body ferments. Whether *in vitro* or *in vivo*, experiments have shown that, in the case of every ferment it was possible to test, the presence of radium in small quantities increased the rapidity of its action. Consequently metabolic interchange is more rapid and elimination of waste products more complete."

In the "International Journal of Surgery," Vol. 28, we find the following:

"Probably, it will ultimately be found that, aside from its decided analgesic power, the therapeutic value of radium water is mainly dependent upon its favorable effects upon the metabolic process and upon enzyme activity."

Moriarta in "Medical Record" states:

"Whether the action of radium is autolytic,

catalytic or by its electrical force exerted on the individual cells, as taught by Von Noorden, is beyond my determination. But I do know from my laboratory findings that radium promptly and invariably increases the number of red blood cells. From this single finding it is obvious that the remedy is a potent one and must of necessity augment all of nature's processes, no matter how complex they may be. Thus the results might be said to be secondary, though they are usually attributed to the direct therapeutic action of radium, and include a general stimulant and tonic action, the increasing or modifying of secretions and excretions, the raising of suboxidation processes, combatting toxemias, stimulating universal cell activity, etc. Just as a pneumonic may be carried through a crisis, with a large number of cells out of commission, by the use of oxygen which stimulates the remaining cells to increased activity, so radium stimulates and gives fighting material where there is cell life."

It is thus seen that radium water is not a drug and does not act like drugs. Its action is entirely a physical one. As the atoms of radium and mesothorium disintegrate they expel billions of Alpha rays within the body. These rays act upon the cells, the glands, the tissue, organs, etc., in a manner similar to the ultraviolet rays. In order to get these rays in the body it is necessary to introduce into the body the genuine elements of radium and mesothorium and this is possible only with Radithor.

By virtue of these marvellous Alpha rays acting upon the cells, as explained above, the endocrine glands and other body tissue are stimulated and normalized. The action is identical with that of sunshine on a plant that has been in the dark for some time.

Of course these radioactive elements do not remain in

the body all the time. If one takes a single bottle of Radithor some of the elements will be eliminated in a few days and then the process of elimination is gradual for several months. The elements are excreted through the intestines and kidneys for the most part while the emanation (the gas) finds its way out through the lungs. If one takes Radithor each day we find that in about ten days we reach a point of equilibrium, that is the absorption and elimination are equal.

CHAPTER XXI

METHODS OF RADIUM WATER TREATMENT

To prevent any misunderstanding in regard to radium water let me make myself clear on the many methods used.

As I have previously stated, it became common practice many years ago for doctors to give their patients radium water in the form of a solution of radium. This was given as a drink or, in more concentrated form, by hypodermic injections. The radium solution is not used to any great extent now, but the technique of injection is still practiced by experts in this field.

I have mentioned the fact that the radioactive springs pass over ground containing radium and thus absorb the gas (called radium emanation or radon) that arises from radium. In order to duplicate this method several contrivances have appeared on the market known as "radium emanation machines, activators or emanators". Sometimes they consist merely of a jar or bottle in which some radium ore or other substance is used. By placing water in the bottle it absorbs some of the radium emanation (radon) and by drinking the water one thus is presumed to duplicate the waters of the well-known spas and springs.

Devices made with porcelain lining in which the radium, usually a few cents worth only, is embedded have absolutely no therapeutic value according to my experience. Unless the radium emanation can fully pass into the water no apparatus is of any value. I beg to warn the public against the purchase of such contraptions. Even conceding scientific construction of such devices,

the amount of radium that each should contain to give a proper therapeutic amount of emanation should run into several hundred dollars.

Recently more elaborate apparatus has been placed on the market in which the radium is kept in solution in one part and the emanation is drawn off from it into water which one drinks. Although aggressive selling methods have been used to establish the use of all these devices I have not found them of much practical value.

There is no doubt that radium emanation in large dosage gives excellent results in the treatment of certain conditions, but the amount that is usually recommended by such men as Pinch of London is of the order of 300,000 mache units, while few machines offered for home use run over 10 to 20 per cent of this daily dosage, and some are even as low as only 1 per cent of this amount.

In fact, there are several radium jars on the market, said to last a lifetime, that produce as low as 20 mache units a day. Although they sell for $25.00 and more, as a rule, I found one that contained less than 10 cents worth of radium. Any therapeutic results claimed for such devices must have arisen entirely in the imagination. Their wide sale to the public convinces me that Barnum was right, when he said that the people like to be humbugged.

Another feature that renders radium emanation apparatus obsolete in this advanced day of radioactive treatment is the fact that radium emanation remains in the system only three hours. Whether one takes 100,000 mache units all at one time or in a number of drinks during the day only the same percentage of the entire amount is effective. When you consider that it requires a month for this 100,000 mache units to give full effect to its Alpha rays it is evident that in three hours scarcely 3 per cent of the whole 100,000 mache units give any physiological action. This means that of 100,000 mache unit dosage less than 3000 mache units are actually absorbed by the body—the rest of the

dosage, or 97,000 units, being exhaled. This statement can be confirmed by reference to the table of the decay of radium emanation in any standard book on radium.

The American Medical Association calls particular attention to this fact in "New and Non-Official Remedies" as follows: "Physicians should realize that the emanation following the administration of an emanation solution (such as that from radium emanation machines) is very soon lost from the body, whereas a radium solution (and also a mesothorium solution) leaves a large part of its contents in the system to be excreted slowly in the course of several months."

In speaking to other doctors I have met I found that many of them expressed a decided inability to obtain any startling results with internal radioactive treatment and some even condemned it completely as of little value. Yet in every one of these cases I found that the doctor had been using radium emanation apparatus, usually of a low dosage. I was not surprised at their failure. Yet some of them did not understand the difference between using radium emanation machines and the genuine elements themselves as found in Radithor. One cannot possibly get the results with radium emanation that can be secured easily and consistently with Radithor.

It must be borne in mind that Radithor is distinctly a solution of the genuine radium and mesothorium elements themselves. It is not prepared by simply subjecting water to the rays as this is valueless, nor is it prepared by dissolving the emanations or gases of radium in the water as these last only a few days and would serve no purpose. The radium element in Radithor is the practically pure radium chloride itself and will not finally disappear while in the bottle for nearly 20,000 years. The same is true of the very costly mesothorium element used in Radithor, which is more active than radium and hence lasts in the bottle a little over 100 years. The radium in each Radithor bottle will be half gone in about 1700 years, while the mesothorium will

be half gone in about seven years. These periods indicate their relative radioactivity.

Radithor has so far exceeded any previous method of radium water treatment that it has been adopted in hospitals and clinics throughout the world. It gives the greatest possible efficiency in Alpha rays at the minimum expense and thus for the first time since the discovery of radioactivity it brings the blessings of radium water treatment of a highly scientific kind well within the reach of everyone. To avoid any misunderstanding let me say that Radithor is produced only at the Bailey Radium Laboratories, East Orange, New Jersey.

As I have previously stated, Radithor is composed of the two principal radioactive elements—radium and mesothorium. It is put up only in small sealed bottles and every bottle is certified at the laboratory. When one drinks a bottle of Radithor one places directly in the blood stream and the various glands, organs and tissues the genuine pure elements themselves that remain in the system to some extent for months, constantly producing Alpha rays by the millions. Taken daily one gets at the end of ten days a physiological result far exceeding the results obtained from 300,000 mache units of radium emanation daily.

I have given thousands of treatments with Radithor and the experiences I have had in rejuvenation as related in this book have been solely with Radithor—as it is the only scientific method known to-day to give proper radium water treatment. Bailey did not discover radium or mesothorium, nor was he responsible for all of the tremendous amount of clinical work done with radioactivity over a period of years, but through his patient research he did produce Radithor and this marvellous product will stand forever as a tribute to his genius. Radithor contains no drugs of any kind, but the radium and mesothorium are so nicely balanced that the effect of this splendid combination on the endocrine glands far exceeds anything with which I have had any experience.

Radithor is absolutely harmless in every respect. Although a potent agent, yet it contains no drugs of any kind. It produces results entirely through the mild stimulating action of its Alpha rays. A child could take this product for years without the slightest injury. Extremely large amounts have been given to patients without any harmful reaction.

The U. S. Government in one of its pamphlets on Hot Springs claims that radioactivity is largely responsible for the cures effected there. Even the American Medical Association has approved radium water. More than a million cases were treated last year in Europe and for many years great radium clinics have been established under the direction of eminent scientists who reported remarkable cures without any injurious effects.

Therefore, let me make it very plain here that if any doctor or other person states that radium water is injurious he is not telling the truth. Recently some doctors, who I learn have never had the slightest experience with radium or mesothorium, and know no more about it than a school boy, have been trying to garner some publicity by claiming harmful effects from these products. Their statements are perfectly ridiculous and in opposition to twenty years of experience in hospitals and clinics throughout the entire world. Out of millions of treatments given in these years we have yet to have a single record of harmful effects.

I have personally used it for several years myself and am in perfect physical condition, with all the strength, vigor and virility of my early twenties, although I am nearing three score. I have given it to hundreds of patients over long periods of time and instead of seeing any harmful results I have invariably observed a new lease of life and freedom from the severest forms of ailments.

In conditions such as rheumatism, there may be a slight increase in pain for a few days while the toxins are being eliminated from the body, but this soon passes away. In weakened conditions, there is a general stirring up of the body chemistry with a slight acceleration

of chemistry processes to a point where one may feel over-stimulated, but this is usually followed by an agreeable feeling of well-being, and, of course, if one feels too stimulated, one leaves off the water for a few days.

I wish to say a word here regarding radium baths. As is well known, people have journeyed to the great mineral springs of Europe and America not only to drink the waters, but to bathe in them. The curative effects of these baths just as in the case of the drinking treatment are due solely to the radioactivity in the water. It is now entirely unnecessary to visit these springs, as the baths can be taken at home with much better success. By putting a bottle of Radithor in the bath tub, say half full of water, one gets a radium bath many times stronger and far more beneficial than anything that can be obtained at any of the springs or spas. A radium bath twice a week before retiring, in warm water for say thirty minutes, is the most stimulating procedure one can enjoy. It is best to put a sheet over the bath tub and body for a while so as to breathe in whatever emanations may escape from the water. By adding a pound of coarse sea salt to the bath I have seen obese patients lose mountains of surplus, unhealthy fat in a few weeks—and it remained off as long as they kept up radium water treatment.

Lorand calls particular attention to radium baths as follows:

> "The rejuvenating effects of the radium bath can no doubt with full justification be ascribed to their special effects upon the endocrine glands, particularly the sex glands, and in my opinion also the thyroid gland. Increase of sexual desire and potency after the use of these baths has been noted by several authorities. Sommer reported an increase of sexual desire on a monograph on radium and radioactivity. Gottlieb records an improvement of potency in neurasthenic patients after the baths.

The use of radium baths is followed by a marked increase in the output of urine, and in addition uric acid and sodium chloride are eliminated in larger quantities—a fact of great importance in diseases of the kidneys.

Radium baths also have a marked influence upon the blood pressure, and a considerable drop from a high blood pressure can often be observed after their use."

CHAPTER XXII

THE APPLICATION OF RADITHOR TO SPECIFIC PHYSICAL CONDITIONS

In this chapter I am presenting some details as to the exact methods I have used in treating the body to effect rejuvenescence and to overcome many ailments. In a measure, this is the most important chapter in this book, as it gets right down to actual clinical experience. It is possible only to present in a very brief way some of the concrete evidences of the marvellous rejuvenating powers of radioactivity as I have observed them in my extensive medical practice.

There is one matter that I wish to bring to the attention of my reader in connection with the treatment of any conditions with Radithor and that is that the treatment must be continued over a reasonable period of time to get results. I never take a case unless it is definitely understood that the treatment may last anywhere from three to six months and in some conditions even longer. The same applies to anyone who undertakes a course in this product. It is just a waste of time to take Radithor for a few weeks and expect to be made over anew. I have seen some startling effects in less than a month, it is true, but taking it by and large over hundreds of cases I have come to the conclusion that the remarkable results achieved with Radithor are possible only when a course of some duration is undertaken. The people who have obtained the benefits described in this chapter are those who followed through with the treatment. It requires a degree of patience to do this, it is true, but then again the results are well worth it. I have seen some doctors give a patient a month's treatment with

Radithor and then discontinue it because no startling results were seen. These same patients came to me and by my insisting upon a course that often extended for several months we effected rejuvenescence in their case.

As for elderly people my advice to them is to keep their bodies slightly radioactive always by taking small doses of Radithor throughout the years. In fact, it would harm none of us to take a little Radithor now and then just to keep up the proper amount of stimulation after we had set our glands aright with a daily course in it.

Radithor comes in little brown bottles of about one-half ounce. It appears to be simply a colorless liquid. It is tasteless and odorless. The bottles are each sealed carefully and have a wide mouth so that one can drink directly from the thoroughly sterilized bottle itself. Several of the little bottles can be carried in the coat pocket or bag for over the week-end trips. Thousands of people all over the world are now taking a daily cocktail of Radithor.

The matter of dosage is an important one. A single bottle of Radithor is a standard dose for one day. The usual treatment therefore is one bottle a day. Some doctors start all their patients on one bottle daily for the first month in all conditions and then increase or decrease after that, depending upon the degree of reaction and the condition being treated. This is a good plan to follow, although in my own cases I often start with two or three bottles daily. Offhand I might suggest starting the Radithor course with a bottle a day for a month. Then in all chronic conditions, in impotency, in neurasthenia, in striking adrenal imbalance, in rejuvenation treatment generally and in all persons past 60 with marked evidence of senility the dose the second month may well be two to three bottles a day and this can be safely kept up for sometime. If the condition is not serious or chronic one bottle a day the second and subsequent months may answer the purpose [illegible] is no fear of getting an overdose of radium

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water, but there is a fear of not getting satisfactory results unless one takes a reasonable course of Radithor. Nothing less than a three month's course should be taken by anyone and, as I have stated, one could keep up a bottle a day for years if one wanted to be certain of continuous health, strength and vitality.

In considering the dosage of Radithor I have in mind also the matter of cost. Radithor is not expensive. It is well within the means of anyone.

Dr. Field in "Medical Life" states:

> "In that the influence of radium water on metabolic functions progresses slowly, we have found our best results long delayed and we advise no attempt at treatment that does not prescribe a course of at least 16 weeks. Beneficial results, however, are often manifested during the first 10 days of treatment."

Dr. Delano states:

> "The initial treatment should last three months. In a well entrenched pathology we should not expect much change in a short time. It is also to be remembered that the effects are often postponed and the maximum of improvement does not always coincide with the cessation of the treatment. I advise a repetition of the treatment after few months. The likelihood of making improvement permanent is thus enhanced."

REJUVENATION

Naturally the greatest field for the use of Radithor is in connection with the treatment of early old age, senescence, senility and other evidences of decline. In this respect the powers of radioactivity are unchallenged in their supremacy. By stimulating the glands of aging men and women we obtain a reaction in the form of improved mental and physical capacities almost beyond

belief. The ionizing process of the Alpha rays sets up revitalizing forces in these glands, pouring renewed streams of hormones into the blood and bringing about most astonishing results. Aging, wrinkled faces become full and smooth, the sparkle of the eye returns, the bloom of youth appears, the light step and the cheerful mental attitude return, the ambitions of youth spring up anew and romance is rekindled in the human breast.

Is it any wonder that we get such results? Old age is a condition in which there is a lowered biological level. Not only do we find symptoms of a degenerated condition of the thyroid, but other glands as well are functioning below normal. Radium water has proved itself time and again the most ready means known to raise the low biological level and thus bring the glands up to normal functioning power once more.

I have found that the tissue changes incidental to presenility can be arrested and physiological functioning restored in organs and tissues well advanced into a state of senescence. In elderly people using Radithor the ability to inhale and absorb more oxygen and to eliminate a larger amount of carbon dioxide is readily noted. This improved oxidizing and oxigenating power enables all the tissues and cells to share in this natural stimulation. As a result, energy and endurance are increased while physical and mental powers are enhanced. A feeling of new vigor and vitality takes the place of symptoms of degeneration and debility.

There is also a general improvement in nerve functioning, observed in the mental reactions as well as the physiological functions. The capacity to retain names, dates, figures, facts, etc., is increased, with a considerable degree of improved mental keenness. I have repeatedly observed improved hearing and eyesight. No beauty parlor could ever remove the wrinkles and change the dry, scaly, withered skin into fresh looking tissue as does normalization of the glands with radium water.

Once the proper balance is restored to the endocrines, new life is felt in every fibre and made evident in every

move. There is a distinct regeneration of the mental through regeneration of the physical and physiological. The inspiration for achievement is restored, while deep and brooding pessimism is replaced by healthy, hopeful optimism.

Radithor supplies to the sluggish cells a stimulus which results in increased chemistry activity, with the production of more hormones to be sent into the blood stream. The effect of radium water on the cells of the aged is similar to that observed when a plant that has been in partial darkness for some time is placed in the sunlight.

It has been repeatedly noted that under radium water treatment women look much fresher and become more slender. Due to increased thyroid activity a long chain of events takes place—the disappearance of wrinkles, a filling out of the scrawny neck and shoulders, a brightening of the eyes, a sharper memory, a lessening of pains and many other similar evidences of rejuvenescence. We have been accustomed to believe that menopause (change of life) is a natural occurrence, yet radium water treatment has brought a return of the menstrual functions in several instances years after they had ceased.

Improved blood supply sent to the pelvic organs and the tonic effects upon the nervous system generally result in a great improvement in the sex organs, which explains partly why Radithor is a most efficacious measure in impotency and similar conditions and brings about a sexual rejuvenescence in many elderly men.

It has been stated that there is practically no limit to human life and human energies if the entire chain of endocrine glands can be maintained in full normal functioning power. Therefore the constant stimulation of these glands give us an excellent weapon in the treatment of early old age, senescence, senility and in rejuvenation work generally.

One case treated with Radithor is an example of the results to be produced. Age 60, stomach trouble, skin ailments, loss of weight, constantly tired, nervous to the point of hysteria, wrinkled, stiff all over, lacked sexual

powers, a real old man in every way. I quote from his letter after a course in Radithor.

> "I certainly feel much younger. I look younger. I continue to improve in spite of doing what ought to knock me out. Either Radithor or some miracle has done it. I have spoken to many people about radium water. They simply cannot believe it. In my little town of ——————they believe it, for they saw me before I took the Radithor treatment and they see me now. I am a living demonstration to them. I run up and down the stairs. I sit on the porch without an overcoat when every body else hugs the fireplace. Once I could not sit outdoors at night even in summer without an overcoat without becoming stiff. Pains and stiffness are now all gone. I go around without a vest when even young men are wearing overcoats. I have dropped back sexually not into my thirties but into my twenties. My nervousness has entirely gone and the skin trouble has disappeared completely. Something did it—either radium water or the Almighty."

Another case of a woman of 51, active socially for many years. Had deep and prominent wrinkles around her eyes, suffered from insomnia, poor appetite, skin was parchment-like, eyes baggy, cystic goitre developing, terrible mental and physical exhaustion, indigestion, nervousness, fleeting pains, arthritis in hands, cheeks sunken and eyes lustreless. She looked 65 and said she felt like 90. Early senility had overtaken her. After four months treatment the wrinkles seemed to be going and were gone completely in seven months. The cheeks filled out, the skin became soft and velvety, blood pressure was reduced 45 mm., arteries became very elastic, pulse normal, eyes sparkled with the fire and lustre of youth, the arthritis showed great impovement, the nervous condition and sleeplessness went away, the size

of neck reduced very noticeably. She became again interested in social activities and was able to be very busy all day without experiencing the slightest physical or mental fatigue. Looks to-day like 35 and says she feels much younger than that.

SEXUAL REGENERATION

The renewal of sex functions constitutes a valuable part of rejuvenation procedure in spite of the fact that this is not the sole aim of rejuvenation effort. Radium water has long been known as a powerful aphrodisiac (stimulator of the sex glands). I have already referred to this in describing the affinity of radioactivity for the sexual organs. Many authorities have shown that these glands are more sensitive to rays than other parts of the body. On the other hand the splendid successes obtained in sexual rejuvenation of both young and elderly men may be due also to the general increased stimulation of the pituitary, adrenals and thyroid as well as the sex glands. In all cases of sex weakness, impotency, frigidity, decreased libido and various sex aberrations there is a definitely low basal metabolic rate—a lowered thyroid action. Radithor raises these functions with utmost regularity. In practically every case I have treated for other ailments the patient has noted a strong increase in sexual powers and this has also been the experience of other doctors who have used radium water extensively.

One case of man of 58 is an example. Was impotent for many years, yet appeared to be in splendid health. Had no organic troubles but was totally unable to copulate. After three months treatment (two bottles of Radithor daily and radium baths twice a week) he said he had the virility of his youth again. Left off the Radithor and in a month again complained of impotence. Renewed Radithor and sexual functions restored. I advised him to remain on the treatment a year and after that to take a bottle twice a week. Two years later he

tells me that he still possesses full normal functioning power.

NEURASTHENIA

Perhaps the most common condition met with in people of middle and advanced age, and even in those of early life often, is that general tired-out feeling that has been classified as asthenic and which may be included under the broad heading of neurasthenia. Neurasthenia is characterized by a lack of nerve force while asthenia is a general loss of strength, but they both go hand in hand so that the one term neurasthenia will cover all these conditions. No rejuvenation effort can be successful unless this condition can be overcome.

The muscular and mental fatigability experienced after the day's activities are clear indications. Nervous exhaustion and prostration are common. Irritability, weakness of mental faculties, inability to concentrate thoughts are noted. The slightest exertion often causes headaches, vertigo, restlessness, fear and a feeling of weariness and depression. Frequently eye disturbances, heart palpitations, cold hands and feet as well as general chilliness followed by flashes of heat. Insomnia, fatiguing sleep and unpleasant dreams are common. That depressed, lazy, "born tired," never get enough sleep feeling comes upon one. There is a tendency toward relaxation of the walls of the abdomen and a constipated condition of a somewhat chronic nature. Men have pains in the back as a rule and impotence when the condition progresses far enough. Women frequently experience painful menstruation. Mental disturbances, sexual disorders, neuritis, neuralgia, dyspepsia, muscular weakness and various pains are of common occurrence.

There is a general physical weakness, loss of strength, lack of "pep" with little power to endure fatigue—a constant feeling of laziness. One is all dragged out, tired to death, can't seem to finish what is started, usually never gets enough sleep. Has to give up readily, the

enthusiasm is quickly gone even for most desired and cheerfully undertaken objects. It is in this condition that we get that well-known four o'clock fatigue. We cannot work or play with vim and show a decided lack of punch. The chief glands at fault in this condition are the adrenals and the thyroid, which are affected first by the stress of modern condition, social and business activities, worries, pain, rage, fear, etc. Auto-intoxication sets in and the toxin-laden blood prevents normal functioning of the system. Then the many distressing ailments appear—rheumatism, arteriosclerosis, high blood pressure, diabetes, etc. The lowered vitality and general debility experienced are merely the forerunners of senility and early death.

In this condition Radithor has never failed to change the picture completely. Often there is so much to do in getting rid of the toxins and building up the glandular balance that progress may seem slow at first but in no case have I ever failed to see startling improvement under radium water treatment. It is the greatest revivifying influence to the morbid cells that we know of to-day. Under a course of Radithor the heart beats more strongly, the circulation is improved, resistance to fatigue is increased, capacity for intensive work is doubled and the many ailments that threatened the body gradually subside and disappear. I have seen many a man and woman go from the depth of nervous prostration to full vigor and health on a proper course of Radithor. Doctor Armstrong of London who treated ten thousand cases with radium water stated that his best success was with neurasthenic patients, many passing from a state of sheer exhaustion to that of splendid vitality.

ARTERIOSCLEROSIS (Hardening of the Arteries)

In this condition, with its accompanying high blood pressure, radium water has achieved notable success for years. Through the use of Radithor the results have

been simply amazing. I have seen blood pressure reduced from 230 to 176 in a very short time in a case that resisted every other known treatment and after six months the arteries were as pliable as those of a young person. From my experience in this condition and from the experience of hundreds of other doctors with radium water I make the bold statement that one will never get hardened arteries if one takes Radithor constantly, even in mild amounts. It is the only positive preventative known to science and as hardening arteries are the cause of most deaths it is evident that life can be greatly extended by keeping one's body constantly charged with radioactivity through a mild course in Radithor all the time, taking it as one takes coffee or tea.

Patients tell me after a short course in Radithor that they actually feel ten years younger and their arteries and blood pressure show it. I have never yet seen a "stroke" in the case of any patient on a course of Radithor and I question whether one would ever get a stroke if they kept their arteries soft and pliable with radium water.

HIGH BLOOD PRESSURE

This condition and hardening of the arteries go together most of the time, yet there are many people whose pressure rises without having serious arteriosclerotic condition. Perhaps the greatest prominence given to the radium water during the early days was its value in lowering high blood pressure. Some doctors say that it never fails, while others report 99 per cent success. Proescher found an average reduction of 20 mm. in 80 per cent of his cases. I have personally never yet failed to establish a reduction in blood pressure in every one of my cases through the use of Radithor. As a means of reducing blood pressure radium water to-day stands supreme in the field of therapeutics. It is practically the ONLY weapon available to the medical profession

and if it did nothing else it would be worthy of use by every doctor in the land.

We note a disappearance of precordial distress, vertigo, headaches, etc., after a very short course. The elasticity of the blood vessels is increased and the heart is relieved of much unnecessary load. Whether the blood pressure is permanently reduced is a question that is of no interest in a way, as various metabolic processes that can account for the high pressure may arise again when Radithor is discontinued and thus cause a recurrence. The simple solution of this problem is to keep up the Radithor treatment in at least a mild way. Fully 75 per cent of my cases show constant reduction over a period of nine to twelve months and one case examined recently that was treated two years ago showed no material rise though Radithor had been discontinued for some months.

One case, age 45, had a pressure of 260 mm. General condition poor, increasing weakness, loss of weight, very nervous. At the end of six months, the pressure was 180, there was a gain of 30 pounds in weight and the weakness and nervousness were entirely gone.

CANCER

While the subject of cancer may properly have no place in the story of rejuvenation yet it is of such paramount importance that I wish to mention it here in connection with radium water. Everyone past forty dreads this terrible disease and to date no cure for it has yet appeared. At present cutting it out with the surgeon's knife or burning it out with powerful rays of the X-ray and radium are the only means at hand. We have all kinds of theories and claims regarding cancer, but we are just beginning to realize that perhaps it is not the unsurmountable obstacle we have thought. Far be it for me to raise false hopes in the hearts of those who either suffer from this malady or even fear it, yet I have great faith in the possibility of actually preventing cancer

and even successfully treating it in its early stages.

For years Bailey has advocated the use of radium water as a preventative and there is ample evidence to substantiate his claims. It is a significant fact that doctors who have used radium water extensively have been forcibly struck by the fact that cancer has never developed in a single one of their cases that has been on a course of radium water for a considerable period of time. It is strange also that cancer is very uncommon in those places where the springs are highly radioactive. This fact was strikingly brought out recently by the discovery that in the hamlet of Estreys in France, where the waters are very radioactive, no case of cancer or tumor has ever been known and yet in all other towns in France of that size several cases each year are treated by the doctors. In fact, cancer is said to be on the increase in France, yet in all the years that the medical records go back (some two hundred) not a single case of cancer has ever been recorded in that little hamlet.

These observations have led many to feel that cancer cannot develop in a body that is kept constantly activated with radium water. Of late we are beginning to understand why this can be true. On studying the cancer of the breast that is so common we find that this occurs usually after or about the time of the change of life. We know that then the ovarian function diminishes and with this the thyroid activity goes down. The mammary glands (breast glands) are affected by the lowered ovarian action as well and with these three glands reduced we find a general lowering of the intensiveness of the body processes. We then notice a decrease in the differentiation of the cells of the mammary gland and a ready development of undifferentiated cells of a lower biological level. These are the cancer cells. The same thing may occur in younger women when there is a decreased ovarian or thyroid action. By increasing the endocrine gland activities with Radithor we raise the biological level and increase the intensiveness of the chemical and physical processes of the body. This re-

sults in a restraining influence over the development of these undifferentiated cells, thus preventing the growth of the tumor or cancer.

While I cannot and will not say that radium water is a sure preventative of cancer nor to be regarded as a cure in any way at all, yet the evidence presented seems to warrant us in feeling that the work of Bailey along this line is entirely in accord with the latest biological findings by such men as Dr. Francis X. Dercum and other well-known men in the field of biology. All I care to say now is that I am satisfied that if one were to keep on radium water constantly, even with reduced dosage, the chances of cancer ever developing in their system would be greatly minimized.

Above we have covered the ground of general rejuvenation effort. I could give scores of case histories of patients who have been actually rejuvenated with radium water, but I feel that it would be more valuable to take up specific conditions rather than to generalize, as in all rejuvenation treatment we usually find some one condition of a definite nature that needs correction. Therefore, I am giving below a few of the ailments that have been treated with radium water and the results secured. I have not included them all, but I have covered the most important conditions that come under the doctor's observation in the course of his general practice.

ACIDOSIS—Poor thyroid activity causes sub-oxidation resulting in a depleted mineral reserve—lack of alkalinity. This condition responds consistently to Radithor and proper diet.

ADENOIDS—Here there is a definite thyroid subfunction. Putting children on Radithor will usually prevent further adenoid development by stimulating the thyroid and I have seen well-advanced cases successfully treated this way, thus avoiding the all too common operation.

ADYNAMIA—This weakened condition is quite common. There is a deficiency or loss of vital power which is due largely to the lack of proper functioning of the adrenals. We find this condition always in the case of Neurasthenia, which, as I have already mentioned, yields consistently to a course in Radithor.

ALBUMINURIA—Many people have albumen in the urine, due to different causes. It is usually an indication of trouble somewhere in the metabolism or kidneys. In Bright's Disease we find albumen in the urine. In all cases a course in radium water has enabled me to clear up the condition by a correction of the cause.

AMENORRHEA (Scanty or delayed menstruation)—This is a pituitary and thyroid trouble more than an ovarian dysfunction. It is often accompanied by skin ailments, constipation, headaches, lazy feeling, chilliness of hands and feet, shortness of breath and even mental disturbances. Frequently two months on Radithor overcomes this condition entirely, although in most cases an extended course has been found necessary. I have seen a case of a girl of 16 with no menstrual flow for three months regain the menses in two weeks on radium water.

ANEMIA—Both simple and pernicious anemia respond quite well to Radithor by increasing the digestive powers, stimulating the blood-making function of the spleen and improving the general metabolism. I have seen red blood cells increase from one to two million, an increase in hemoglobin from 32 per cent to 75 per cent and a gain in weight of 28 pounds in less than five months on Radithor. Dr. Proescher reports an increase of 200,000 to 1,175,000 red blood cells and a marked increase in hemoglobin in 80 per cent of his cases on radium water.

ANGINA PECTORIS—There is a lowered thyroid and adrenal activity in this case. It is difficult to treat,

but in two patients I got splendid results though in four others the results with Radithor were not so pronounced. Yet I feel that if the patients could be induced to remain on the radium water for a long enough time this condition could be marvellously helped.

ARTHRITIS—At the London Radium Institute arthritis, even in the severe type known as arthritis deformans, is being cured with the utmost regularity with radium water. It is the only kind of treatment known to medical science that can show a large percentage of cures. Arthritis may originate from many causes but the thyroid, adrenals, thymus and sex glands are usually out of balance. In some cases treatment with Radithor produces very prompt results, but for the most part the treatment should be continued from six to nine months.

There are many forms of arthritis, some of gonorrheal origin, rheumatic types, ankylosis, primary and secondary stages, etc. But in practically all of them there is a very definitely retarded metabolism, a chronic auto-intoxication. Naturally results will vary in the different conditions when treated with Radithor, but taking them generally radium water first of all raises metabolism, increases cellular action, improves the antitoxic functions of the body and removes what we call the arthritic diathesis. The action is largely through the endocrine glands although there is some independent physical action of the radium water.

One case, a woman of 50, practically a helpless cripple was treated with Radithor. Her hands were deformed, joints large, knees and ankles swollen. The motion in all joints was limited. She had difficulty in masticating, was always in severe pain. Blood pressure was 240, blood count 3,500,000. After five months on Radithor the pains were entirely gone, she could walk without limping, swelling had largely subsided, blood pressure was down to 185 and the red cell count was increased to 5,200,000. After fourteen months treatment there was scarcely any sign of the deformaties or the en-

largements of the joints and she appeared to be a normal well woman.

ASTHENIA—This is a part of the picture we see in Neurasthenia. All loss of strength of any kind, after illness or where there appears to be no ailment, may be called asthenia. Radithor is the best means of restoring strength in the case of all asthenic patients irrespective of the cause.

ASTHMA—Adrenalin has been used successfully to relieve the severity of the attacks, but the pituitary, thyroid and sex glands are often at fault as well as the adrenals. I have used Radithor with splendid success in this condition. It appears to so affect the vasomotor nerves and the mucous system generally, through the circulation, that the tendency on the part of the bronchial tubes to contract in their spasmodic way is overcome. A chronic condition requires an extended course in Radithor to bring about proper oxidation and destruction of toxic protein metabolism.

AUTO-INTOXICATION—This is a general term that may result from many disorders, but the thyroid, adrenals and the spleen can readily account for most cases of auto-intoxication. I always use Radithor over a period of time and find that the toxic conditions are driven from the body under its influence.

BACKWARD DEVELOPMENT—Children who are backward mentally and physically and even women who seem to be underdeveloped can be very successfully treated with Radithor. The boys and girls who are inattentive at school and cannot concentrate often have a thyroid and pituitary deficiency. There is a glandular defect also in the case of the children who are slow in developing physically. Girls arriving at puberty have a delayed appearance of the menses. Often there is an actual lack of development of the sex organs. In the case of women they are weak, pale, listless, lack energy and vitality, are nervous, high-strung, irritable with

frequent headaches, neuralgia, dyspepsia, constipation, melancholia, poor menstruation, bad complexion and often skin eruptions. Under Radithor treatment the blood pressure raises to normal, the pulse comes up and there is a general glandular stimulation with a splendid new blossoming of womanhood in all her glory and charm, both physical and mental.

BACTERIAL INFECTIONS—Radium water has done splendid work in helping increase resistance to bacteria, for it increases the anti-toxic powers of the glands to destroy germ life. Few germs can survive where there is oxygen and sunshine. Radithor furnishes ample oxygen to the cells and is like concentrated sunshine in the body. Those using Radithor regularly have reported that colds, grippe, influenza, etc., now pass them by. By enhancing endocrine gland activity with Radithor we very readily oxidize toxins of nearly all kinds.

BLOOD PRESSURE (Low)—Radium water has been extolled by medical men the world over as almost a specific for high blood pressure, yet we find it equally as effective in low blood pressure. By stimulating the glands and normalizing the chemistry the lowered biological processes are raised with a consequent rise in the lowered blood pressure. When the thyroid and other glands are below par the blood pressure is low—in neurasthenia for example—but a rise in the pressure always follows a course in Radithor.

BRIGHT'S DISEASE—This serious condition can reach a stage where death ensues through actual destruction of the kidney cells. It is largely due to poisons that irritate and destroy the kidney. For years radium water has been used in this grave disorder and even in the serious condition known as nephritis. It has been found of intrinsic value in holding the process in check. I have seen, after a few months treatment with Radithor,

the albumen and hyaline casts practically all disappear, blood pressure become lowered and a marvellous increase in strength and weight with total elimination of headache, shortness of breath and the frequent precordial distress.

BRONCHITIS—This serious and unpleasant disease has been overcome by me with great regularity in my practice through the use of radium water. In my experience all catarrhal conditions yield to radium water. In bronchitis especially results have been most encouraging.

CATARRHAL CONDITIONS—In catarrhal disorders generally we find that the thyroid, adrenals and sex glands are at fault. Splendid work has been done in many such cases by simply stimulating the thyroid. In all catarrhal cases of mine I have used Radithor with entirely satisfactory results in every case.

CHLOASMA (Liver Spots)—This condition accompanies many disorders of an endocrine origin, chiefly the adrenals. This condition clears up in a few weeks under Radithor treatment when we correct the seat of the trouble.

CHLOROSIS—This anemic condition found in young girls as a rule is greatly helped by the same treatment that is given in any anemic condition. Radithor is now standard treatment for chlorosis as it increases the red blood cells and with proper diet restores complete health to the patient.

COLDS—I have never used Radithor as a cold cure, although one of America's foremost doctors recently stated that he could cure a cold in a few hours with Radithor. To keep from colds the thyroid and adrenal glands must be kept well-stimulated, thus increasing

resistance to infection. My patients under Radithor treatment seldom complain of colds, although many of them were formerly very subject to them.

COLITIS—When the colon becomes inflamed we have a condition that has been known to result seriously, due to the development of toxins. In colonic colitis I irrigate with oil of sesame and radium water as well as giving the regular drinking course. Relief and a cure are absolutely assured.

CONSTIPATION—This is the condition that keeps pill factories busy day and night. While a glass of water before breakfast and proper diet will overcome constipation in many cases yet frequently there is a very definite endocrine condition that must be corrected. To a large extent the thyroid is at fault for, by functioning below normal, all the body processes are lowered and, irrespective of the most careful diet, many will find their constipated condition persists. Radium water was long thought to be somewhat of a cathartic as it overcame chronic constipation with regularity, but now we know that the splendid success obtained with Radithor in this condition has been due to the fact that it activates the glands and the body chemistry generally. I have seen even old cases of chronic constipation that have used laxatives for years gradually discard them entirely under Radithor treatment.

DEAFNESS—I have used Radithor on many cases of deafness, particularly in elderly people, and have been rewarded in the majority of these cases with a return to normal. Of course, some cases of deafness cannot be cured at all but where the condition is due to a lack of chemistry activity, where the thyroid function for example is below par, I have found Radithor a splendid means of restoring hearing.

DEBILITY—This general term covers the weak tired-out feeling that comes under the heading Asthenia, Adynamia and Neurasthenia. There is nothing in the world like a course of radium water for such a condition. Drugs may stimulate for a while but they set up a harmful reaction sooner or later, while Radithor actually restores the vital forces.

DIABETES—In diabetes mellitus (sugar in the urine and blood) the chief gland at fault is the pancreas, although other glands are involved. Radium water offers as much hope in this condition as does insulin and is used by many in preference to the latter, because Radithor stimulates the glands to do their proper work. One case of 60 had sugar in urine for three years, failing heart, great loss of flesh, drowsiness and auto-intoxication. Sugar was 8%, specific gravity of urine 1042. In four months on Radithor sugar was 2%, specific gravity of urine 1025 and patient was able to walk two miles a day. In eight months had gained 11 pounds and urine was absolutely free of sugar and has remained that way for several months without recurrence.

In diabetes insipidus (polyuria) the pituitary gland is largely at fault. The one case I had was completely cured in four months.

DYSMENORRHEA (painful menstruation)—To a very large extent this condition is due to a lack of functioning of the ovaries, thyroid and pituitary. I have treated many cases of this kind as it is very common. Under Radithor treatment the pain and irregular flow as well as the nervous irritability are completely overcome.

DYSPEPSIA—In many cases of indigestion or flatulency we see a very prompt improvement with radium water. Perhaps a larger part of these ailments than we imagine are due to poor adrenal functioning as well as pancreatic insufficiency. I have never seen any failure

of a distinct improvement in this type of stomach trouble, so-called, when the patient undertook a reasonable course in Radithor.

DYSPNEA (Shortness of breath)—In this condition there are many causes but we usually find a poor working thyroid. Many of my patients, treated perhaps for other troubles, reported a very prompt improvement in their breathing. Dyspnea has been overcome time and again in many clinics using radium water and should be treated always with radium water irrespective of the underlying cause.

ENURESIS (Bed wetting)—In children it is usually a thyroid condition as well as a pituitary dysfunction, except of course where due to tonsils, adenoids and similar conditions. Yet even here we can go back to the endocrine glands for the basic causes. In adults the prostate seems to be primarily at fault, though the thyroid as well is an offender. In the half dozen cases I have treated with Radithor I have seen a marked improvement in a short while and a cure in every case after a proper course of treatment.

EXHAUSTION—In many cases we find a great loss of vital power characterized by severe exhaustion. Just as we obtain success in adynamia, asthenia, debility, etc., we are likewise successful with radium water in the most severe states of exhaustion. The patient feels the influence of the stimulating rays almost at once, color comes to the cheeks, the blood pressure and pulse rise, there is an increase in the red blood cells and a rapid return to normal is quickly assured.

EYES—In dim vision, eye strain and like conditions radium water has been of great value to me. This is especially true in the case of elderly people whose eye sight invariably improves while on a course of Radithor.

I have not used radium water in the many eye troubles that are met with in special eye practice but from the splendid success I have had in many eye conditions I recommend its more extensive use in this field.

FLATULENCE—Gas in the digestive canal is a symptom of a fermentation condition arising from faulty chemistry processes. Radithor has been used by me a great deal in this and similar distressing conditions with excellent results. It gets to the seat of the trouble and corrects the chemistry. In all cases I advise a glass of warm water before breakfast.

GENITAL DISORDERS—These conditions have been covered by me elsewhere under the heading of amenorrhea, dysmenorrhea, impotency, etc. In the field of genital disturbances Radithor is being used widely by numerous physicians, as the male and female glands respond admirably to radioactive stimulation as has been repeatedly shown.

GENITO-URINARY—Flushing bladder with water containing Radithor has proven of great value in many genito-urinary conditions, especially where done in connection with a regular Radithor drinking course.

GOITRE—Simple, cystic or colloid goitre is ascribed to too little thyroid gland secretion—due to a lack of iodine in the water or to other causes. For many years it has been remarked that in localities where springs were highly radioactive goitre has been practically unknown. That it responds to Radithor treatment has been demonstrated many times in my own practice, the duration of the treatment depending upon the degree of chronicity of the case.

Exophthalmic goitre is due to an oversecreting thyroid combined with an improper ovarian function in women and a pituitary involvement in men. Some goitres of this type, however, show a distinct adrenal imbalance

rather than a thyroid defect. We usually find the thymus gland involved as well. This condition may respond to Radithor treatment at once or it may take some time to get results. Once, however, we get the proper glandular stimulation to balance any over-secreting glandular effect we do see a prompt reduction in the high degree of nervousness, the rapid pulse, pop eyes, etc.

GOUT—Combined with a simple diet, Radithor has proved my mainstay in gout. Thousands of cases of this disease have been treated in Europe with complete success on radium water and it is standard treatment there. Tests have shown that the insoluble gouty deposits known as monosodium urate are broken up by radium into soluble elements that are readily eliminated. The increased oxidation due to thyroid and adrenal stimulation with Radithor corrects metabolic processes, thus preventing further deposits of uric acids, urates, etc.

One case, aged 50, had right toe badly swollen and tender. Leg was also swollen and patient was even confined to bed. Had two previous attacks, one lasting for six weeks. After four months on Radithor the pains were gone entirely and six months later there was no recurrence, the patient having been on Radithor that entire period. The statistics on gout show 81% cures with radium water. At times some cases show a recurrence, but none where they have kept up a mild radium water treatment.

HAY FEVER—I have not had any personal experience in this condition, but Dr. Park reports splendid success with radium water. One case he had was 30 years old, had annual attacks for years. He was treated with radium water in the spring and a mild form of treatment was kept up until fall. Patient passed through the summer without any attack for the first time in eight years. He had no recurrence the next summer.

There is a pituitary and adrenal deficiency in hay fever and without question the effect of radium water in activating these glands readily accounts for the splendid success reported by doctors who have treated such cases.

HEADACHES—Many patients coming for treatment for various conditions report chronic headaches. Under regular Radithor treatment the increased oxidation has had the effect of clearing up this condition as a matter of course for the patients later remark that they experienced no further such attacks while on the radium water.

HEART TROUBLES—Nothing can be expected of radium water in conditions of structural change in the heart, but most of the so-called heart cases I have examined are usually due to other disorders such as goitre, indigestion, etc. In such cases and in fact in all cases where there is no self-compensation Radithor has given excellent results and has been employed in this form of ailment in many leading clinics with excellent success.

HODGKIN'S DISEASE—This condition of the lymphatic glands, akin to leukemia, has been treated with radioactivity for many years with especial success. There is always a low red blood count. It is necessary to take a rather heavy dosage of radium water and the patient should rely on the advice and co-operation of a first class physician. An assured success can be obtained under proper treatment.

HYSTERIA—This is a purely ovarian condition with marked adrenal insufficiency. Radium water treatment has a splendid effect on the blood pressure and circulation thus overcoming the tendency towards nervous climaxes and explosions.

IMPOTENCY—This condition has been fully covered by me under the heading of "Sexual Regeneration".

INDIGESTION—People with poor adrenals suffer frequently from indigestion. It is felt that the parathyroids are also concerned in this trouble. I have used Radithor as a regular routine treatment with ample success, especially in the case of elderly people. The diet must also be regulated to get the maximum results.

INSOMNIA—By correcting the underlying cause in this condition radium water has proven of great value. Radium water has a well-defined soporific influence, due perhaps to its action in widening the blood channels. It has a sedative and soothing effect upon the nerves and an anodyne effect is very commonly observed.

INTESTINAL PARESIS—This condition is largely due to a faulty pituitary action we believe. It is a serious matter and requires prompt measures to overcome it. We notice the condition frequently after an operation. A good strong dosage of Radithor for a month will usually alleviate the condition but the radium water course should be continued over a period of time after that to get the glands functioning normally again.

KIDNEY TROUBLE—There are many forms of this and I have mentioned a few under their specific heading. In 19 cases of cardiovascular-renal degeneration the shortness of breath, blood pressure and kidney elimination were generally improved. There was a distinct feeling of well-being, a lowered blood pressure in all cases, an increased kidney efficiency and an increase in red blood cells.

LOCOMOTOR ATAXIA—In this disease I cannot hold out any hope of a definite cure with radium water, although in early cases I have obtained very good results. We usually find a syphilitic history in this condition, known also as Tabes Dorsalis, and measures must be taken to treat this cause. Here radium water comes in a valuable ally. Radithor will always rid the body of

the lancinating pains that are so agonizing and should always be used in the treatment of same.

LUMBAGO—In five cases I have treated I received good results in all but one case.

MALARIA—In chronic malaria we can always effect a complete cure by radiation of the spleen. The plasmodia disappear from the blood entirely. In several cases that I have treated with Radithor I find the effect on the spleen to be quite equal to that of external radiation, but I would advise both treatments in this disease.

MALNUTRITION—Stimulating the adrenals, gonads and spleen through the use of Radithor has brought in many cases an amazing change in the nutrition by building healthy tissue and increasing strength and vigor.

MELANCHOLIA—Most melancholic cases show a deficient thyroid and adrenal functioning, resulting in decreased oxidation. This is the secret of melancholia. By increasing the oxidation processes with Radithor the despondent and depressed condition disappears. Thus in cases of hypochondria the use of Radithor would undoubtedly prevent many suicides and turn the lives of the patients into happy useful channels.

MENOPAUSE (Change of life)—This is a serious time for all women. The cessation of the menses often brings in its train serious glandular upsets that are not only of a highly distressing nature but are often fraught with grave consequences. From my long experience with numerous cases of this kind I can truthfully say that womanhood has no better aid to guide it through this perilous period than the stimulating, oxidizing, rejuvenation action of radium water. I recommend Radithor to all women passing through this climacteric as a reasonable certain means of keeping the glands well balanced and to thus avoid possible disastrous consequences.

The thyriod starts to go down when the ovaries give up active work and with these the pituitary gland often becomes imbalanced. The headaches, pains, hot flashes, etc., of this period are merely evidences of a distinct gland imbalance and Radithor should be resorted to at once and kept up through the entire period.

MENORRHAGIA (Excessive menstrual flow)—This condition is usually due to a poor thyroid and pituitary activity. I have seen the condition relieved in two months on radium water, but where the case is chronic a longer period has been found necessary.

MENSTRUAL DISORDERS—These conditions I have described under the specific headings as amenorrhea, dysmenorrhea, etc.

METRORRHAGIA—I find this condition rather common in the case of anemic women. Under radium water treatment we obtain splendid results through building up the blood-making organs, the blood and the general body chemistry.

MIGRAINE—Literally millions of women suffer from what is commonly called sick or bilious headache. While many causes are given the chief cause of a true migraine is an ovarian dysfunctioning. By correcting this we find that the headaches disappear. The same is true with the headaches due to biliousness, anemia, dyspepsia, neuralgia, rheumatism, etc., as under the influence of radium water a remarkable chemistry balance is obtained. Doctors would do well to study carefullythe serious aspects of true migraine that has its onset as a rule in girls at puberty and often bothers them throughout life or until the ovarian dysfunction is corrected.

MYALGIA—A few of my patients have complained of pains in the muscles when they came for other treatment. Under the regular Radithor treatment the pains

have been consistently relieved along with an amelioration of the other conditions.

MYASTHENIA—This condition of muscular weakness is one that is characteristic of general neurasthenia and its treatment with radium water has been described by me under that heading.

NAUSEA—We find this unpleasant sensation in a great many ailments. It is a symptom of imbalanced chemistry due to endocrine dysfunction. When we correct the faulty ovarian action as, for example, in migraine, we find that the nausea disappears. The same holds true with the use of radium water in the various other conditions that give rise to nausea. In the case of those subject to sea-sickness I find that a course in Radithor prior to a sea trip makes the person entirely immune from trouble of this kind.

NECROSIS—In this condition the process of repair or absorption is deficient, due to poor thyroid action. I have observed most favorable results in such cases under Radithor treatment.

NEPHRITIS—Kidney conditions generally respond in a splendid manner to radium water treatment. Nephritis reaches a stage where death ensues unless the process is controlled. For this purpose Radithor serves as an admirable adjunct practically always reducing the high blood pressure seen in this condition. Possibly much of the good results from Radithor treatment may be ascribed in nephritis to the stimulation of the thyroid.

One case, age 62, had a blood pressure of 180 with vertigo, precordial distress, insomnia and gastro-intestinal fermentation. In four months on Radithor the blood pressure was 140, there was no albumen or casts and in fact all the symptoms were relieved.

NERVOUS CONDITIONS—Nervousness or neurosis arises from many causes but the relation of the endocrine glands to this condition is now thoroughly understood. Well activated adrenals and sex glands means a disappearance of nervous symptoms in most cases. For this purpose I have found nothing surpassing Radithor. As one patient expressed it "My nervousness has dropped off like an old coat".

NEURALGIA—In cases not due to some focal infection this condition can always be successfully treated with radium water. Radithor is my main reliance in neuralgia. One case of 55 had chronic neuralgia with angina pectoris for several years, together with epigastralgia and chronic scaly eczema on the face. Pains were very severe. Under Radithor there was a marked improvement in three months and a complete cure in eight months with blood pressure down from 220 to 175.

NEURITIS—By stimulating the thyroid and adrenals with radium water we seldom fail to increase oxidation to a point where neuritis disappears. One case had neuritis for six years and slept about one hour a night. There was pain in the left arm and from the base of skull down the lumbar region constantly. Had to use drugs to ease pain. The blood pressure was 205. In seven weeks of Radithor treatment the blood pressure was down to 170 and the pain nearly all gone. In five months the patient was completely relieved. At the end of one year he slept twelve hours a night, gained 30 pounds and said he felt twenty years younger.

OBESITY—Some cases of obesity are due to overeating and the simple cure is to eat less. Most cases are, however, of an endocrine origin. The most common type is the subthyroid. In such types the fat literally rolls off when placed on a radium water course and the stimulation of the thyroid with radium water causes an increased oxidation and elimination. One

case of a lady 21 who was generally obese throughout although a very slight eater. She weighed 165 pounds and was 24 pounds overweight. In five months she lost 22 pounds on Radithor treatment without any change of diet.

A very common type of obesity is where there is a girdle of fat around abdomen with fat to the ankles. This is a pituitary obesity. By stimulating the pituitary gland with radium water there is a rapid change in the fat distribution. One case of a lady 23 years old. She was very fat down both lower limbs. In seven weeks her weight was reduced six pounds and in four months the weight was down 11 pounds. The fat disappeared around the abdomen and her legs and ankles became slender. When she discontinued the Radithor the fat again appeared around the old places, but by keeping her on a mild dosage she has been able to maintain a very trim appearance for over two years.

In all obese cases I have treated with Radithor I have noted not only consistent reduction in weight but an increase in energy and the capacity for increased effort. This is because there is an increased oxidation of the fats.

PARALYSIS AGITANS—I have not had a case of this kind, but other doctors have reported decided improvement with radium water due to the fact that the parathyroid glands were no doubt activated.

POLYURIA—This is the same as diabetes insipidus and is characterized by an excessive secretion of urine, due to faulty pituitary gland action. By proper glandular stimulation with Radithor this disease is readily overcome.

PREGNANCY—In this condition the thyroid gland is very apt to be affected. This is especially true of mothers past forty, where we see a very common condi-

tion of hypo-thyroid which often has serious import for the child. Bailey feels that this can account in a large measure for the exceptional number of aberrant children born to mothers past forty. I always recommend Radithor to all pregnant mothers of any age and I have seen splendid results in cases of vomiting in pregnancy, albuminuria, ovarian toxemia, etc.

PROSTATE—Men past middle life complain of prostate trouble with great regularity. Operations for enlarged prostates are serious matters. I have seen prostates reduce to normal in a very few weeks on Radithor. Sluggish prostates are cleared up and activated with the general activation of the body chemistry and clearing up of the urine.

RHEUMATISM—Perhaps radium water has been no more widely used than for rheumatic conditions. In fact in some types of rheumatism radium water is regarded as practically a specific. Both acute and chronic rheumatism are due to an accumulation in the blood of waste products and toxins largely as a result of improper elimination of cellular activity. To a considerable degree this is due to subthyroid function. Elderly people get it because elderly people have a subthyroid in most cases. Radium water promotes absorption and secretion and attacks inflammatory conditions. People living in the vicinity of radioactive springs never know what rheumatism is. When the focal aspects and diet are properly corrected, Radithor offers the medical profession the most effective means known to science to-day to combat rheumatism.

One case age 60 suffered for twenty years. Salycilates relieved her to some extent, but never cured. Blood pressure was 190. In four months under Radithor the symptoms disappeared and blood pressure was 150. In one year there was a complete recovery.

The bactericidal action of radium water must not be overlooked, for it has a destructive effect on gonococci

and hence has been especially effective in gonorrheal rheumatism. In chronic rheumatism the relief of pain and of the swelling and stiffness of the joints has often been very striking.

RICKETS—The use of radium water in this condition brings a blessing to the thousands of children suffering from this deficiency disease. While sunshine, cod liver oil and similar treatment come first of all yet the addition of Radithor, one or two bottles a week, brings almost unbelievable results. This application of the rays of radium and mesothorium is exactly in line with recent findings in connection with the beneficial influence of rays on rickets.

SCIATICA—Where sciatica is not due to a definite injury of the joint or nerve, radium water will give a high percentage of cures. Many thousands of cases have been treated in Europe with marked success and radium water is being used more and more each day for sciatica.

One case of 48 that had suffered for years experienced an entire absence of pain in 11 weeks on Radithor treatment, with increased energy and a new feeling of renewed life. After seven months there had been no recurrence, the patient having been kept on a mild dosage throughout that period. As a general rule it takes about four to five months to get completely rid of sciatica in the average case. It may be said that about 80% of all cases, including the old chronic cases, receive inestimable benefit from Radithor.

SINUS TROUBLE—I have never seen a case of sinusitis that has not been definitely cured with Radithor. Several cases of frontal sinus, for which operation was recommended in each case, were completely relieved by Radithor. One case with constant headaches, albumen and casts in urine and severe suffering was placed on radithor. In just one month the albumen and casts had disappeared, the pain was nearly gone and in three

months all the acute and distressing symptoms of this condition had gone. My advice to the physician in sinus cases is to put the patient on a three months' course of Radithor and operations will be unnecessary.

SKIN AILMENTS—I have used Radithor most successfully in all kinds of skin conditions such as blotches, pimples, eczema, eruptions, psoriasis, acne, scaly and itchy skin, etc. As the thyroid and other glands control skin nutrition it is evident that by activating these glands we get a healthy tone in the skin and an eradication of the ailments. The rapidity with which Radithor clears up skin troubles, even where there were old sores and eruptions, has often amazed me. I have yet failed to find a skin complaint due to faulty endocrine action, that has not improved remarkably on Radithor.

STOMACH TROUBLES—This is quite a general term for a host of conditions. Gastritis, ulcers, gastric dilation, gastroptosis, gastralgia, dyspepsia and many more ailments might readily come under this general classification.

The great mineral springs that contain radioactivity have been extolled for years as possessing marked curative properties in stomach derangements and thousands who have visited these springs can vouch for the value in stomach troubles of such a course. I have used Radithor in countless cases and can say that my work has been attended with splendid success. A complete treatise on stomach troubles would take too long here, so that I shall merely urge everyone suffering from any form of stomach ailment to put themselves on a course of Radithor and watch the constant improvement that results.

TABES DORSALIS—In this condition the best that can be hoped for according to my own experience is a certain diminution of the lightning pains.

TEETH—Such remarkable results have been obtained by many doctors with radium water in dental conditions that a wide new field is opened up to the dentist. In pyorrhea alveolaris I have seen very prompt results. A spoonful of Radithor in half a glass of luke warm water as a mouth wash daily takes away all bacteria and renders the gums hard. Serious cases should have Radithor full strength syringed into the pus pockets frequently by the dentist. Patient should also take Radithor regularly as a drink to stimulate the pituitary which is the gland largely at fault, causing dental caries especially in childhood and adolescence.

One case had pyorrhea with tooth inflamed to extreme tenderness, very loose with beefy gums and an alveolar abscess. The tooth was made firm and serviceable by the use of ¼ bottle of Radithor injected each day beneath the gums.

TUBERCULOSIS—We do not classify radium water as a treatment in tubercular conditions, yet its use is recommended with other treatment. In this condition there is usually a poor adrenal and thyroid action which is stimulated by the radium water. In all deficiency diseases of this kind Radithor gives the effects of sunshine and thus aids in building up the mineral reserve. I have seen patients gain in appetite and in their ability to assimilate food. Night sweats were decreased, oxidation improved, eliminatory functions activated and the weight increased even in second stage cases.

ULCERS—Chronic ulcers (gastric and varicose) have responded very favorably to Radithor. The stimulating action of the radium water on the parathyroids overcomes the deficiency of ion calcium and the toxic condition.

VERTIGO—There are many causes for this condition, but as a rule it is caused by constipation or dyspepsia and at times we notice these attacks of dizziness in

migraine. I have always obtained very satisfactory results with radium water in vertigo because we corrected the underlying causes.

WRINKLES—This is not a disease, but so many people are interested in ridding themselves of this sign of old age that I mention it here. Wrinkles show that there is a lack of proper skin nutrition and a loss of muscle tone. Radithor smooths out the wrinkles and tightens the skin in a purely natural manner. There is no mystery about it. Improved metabolism and increased thyroid and sex gland activity result in new fat deposits beneath the true skin and in an increased muscle tone in the skin muscles. In all my treatments of elderly people for any condition I notice with the utmost regularity an improved circulation in the capillaries of the skin and a decrease in wrinkles with a fresher appearance of the skin. Old skin brightens up and looks younger. Cases where the skin was atrophic and parchment-like soon became soft as that of a child.

In this chapter I have described the value of radium water in the principal conditions that I have met with in my medical practice over a considerable period of time. I have mentioned a large number of ailments, it is true, and one may well be tempted to say that we are expecting altogether too much of any one preparation. How can the same form of treatment that cures anemia be successful in arthritis and a host of other conditions so far removed from them? The answer is clear. That is just why I took all the pains I did in the first part of the book to take my reader step by step through the various chapters so that a very thorough understanding might be had of the action of radium water through the endocrine glands.

With the average ailment we find a lowered level of gland and chemistry action—what I have described as a lowered biological level. This we find in anemia, in high blood pressure, in arthritis and in all the conditions

described above. When we use radium water we simply raise this level through the action of the Alpha rays on the cells and thus we bring about a glandular and chemistry balance. With the body mechanism properly balanced as Nature intended it should be, and as it is in the case of normal people, the body mechanism runs smoothly and perfectly. As a result the various ailments disappear. Thus the only real job we are giving to radium water is that of restoring the glandular and chemistry balance. That is all we ask of it. We do not say that radium water will cure so and so ailment. We don't have to say that. We merely say that radium water will bring about a balance to the body mechanism and with this functioning as it should the ailments disappear.

This seems to me simple enough for even the most obtuse to understand. Why look for things that do not exist? There is a cause for everything in this world. Nothing "just happens." We say that the plant grows. It does not. Take away the light or the air or the water and the chemistry processes in the plant stop. In other words it develops ailments that may result in the death of the plant. Upset the chemistry processes as Nature devised them for the human being and the same things happens. This isn't advanced medicine. This is just common sense.

The old school of doctors seemed to feel that they had to have a special kind of medicine for each kind of disease. And so the list grew with variations that bewilder one. I have looked over some fifty thousand prescriptions in my day for the relief of a few hundred ailments. Yet all the poor ailing body needs in most cases is to have its glands and chemistry working as the Almighty planned it and health is restored. The plant does not need any complicated prescription when it doesn't grow well. Just give it plenty of sunshine and water. The chemistry processes will then run themselves.

I am getting tired of reading in medical books that

such and such a disease is due to "heredity, sex, age, etc." Ailments are due to definite physical causes. It does not get us anywhere to say that women have arthritis or cancer when they pass forty more frequently than those before forty and then simply ascribe this to age. It is because there is a change taking place in the ovaries and this change results in an unbalanced endocrine, and hence chemistry combination, which leaves the way open for the development of any number of ailments that seem to occur after people pass middle life. To say that certain forms of anemia, like chlorosis, occur in women because they are women does not get us anywhere. It is because their ovaries are not functioning right. To say that because a man's father or mother died of cancer he has inherited it is all nonsense. He has simply inherited the endocrine imbalance that permitted the development of cancer just as it might have opened the way for the development of any other condition. Bailey has enunciated this principle of the inheritance of endocrine imbalance in no unmistakable language and ere long the scientific world will take cognizance of it, for his statements on this score are as revolutionary as Darwin's work in evolution.

Let us cease looking for a definite specific for each definite ailment. Let us stop resigning ourselves to fate as medical books do when they give heredity, age, etc. as causes of diseases. Let us recognize the paramount influence of the endocrine glands over the human body and by control of these be able to overcome these diseases. Radium water—Radithor—is the best means I know of at present to effect this. I don't know what may be discovered to-morrow. I don't know what new developments in this line will be brought out by Bailey. But I do know that we have in radium water a well-nigh perfect means of restoring glandular balance and, through this, of correcting most of the ailments that are met with in ordinary medical practice.

Call radium water a "cure-all", if you wish. Call sunshine a "cure-all". Yet here they are, ready and

willing to serve mankind to wipe out a large part of the bodily discomforts with which most of the human race is afflicted at some time or other. I have done my best to tell you of the results that I have had with radium water in my own work and, as I have shown, this has been confirmed by hundreds of other doctors. The same results that I have obtained in the numerous conditions mentioned above may be obtained by anyone, but let me warn my reader that they must not expect miracles. They must exercise patience. Don't take a bottle of Radithor and then look in the glass at yourself to see if you have been transformed. There is much tedious work to be done by these billions of tiny healing rays from radium water and you must keep adding new armies of rays daily until the battle is won. This may mean only three months or it may mean more, but if you will have patience and follow through with a radium water course the most astounding rejuvenating results await you, irrespective of your age, sex or physical condition.

CHAPTER XXIII

UPON A NEW THRESHOLD

THE influence of radium water treatment is very far-reaching, for by raising the level of biological processes we are able to exercise a wide control over the whole gamut of mental and physical conditions that arise as a result of the lowering of the intensiveness of chemical and physical processes in the human organism.

The work being done, in the development of basic qualitative and quantitative knowledge of the line of endocrine treatment with these newer tools of science, is of transcending importance to the human race in many respects. It has as its object the conservation of physiological functioning power, of improved mental capacities, of robust health and of increased longevity. We are on the quest of big game. We are on the verge of tremendously important discovery. We have gone a long way, for we now know that all human architecture, size, shapeliness, symmetry, beauty, hair, teeth, in fact all human character from the noble, altruistic and virtuous to the lowest, basest and most bestial, may now be analyzed and traced directly to the endocrines. The currents and counter currents that make human life in all its mysteries and diversifications are now resolved into such orderly form that they may be termed scientific fact. They may now be classified, grouped and proportioned with astonishing accuracy with respect to the microscopic steam of hormones secreted by these "mighty dictators of human destiny".

It must be evident to those who have followed this text thus far that since the endocrines are the indomitable and autocratic controllers of human life, they must

also have within their domain the powers of life and death. Life is what your endocrines make it. Death is their final dictum. Physical energies, mentality, optimism, pessimism, memory, forgetfulness, vitality, impotence, sluggishness, senility—these are results not causes. These are controllable or correctable by endocrine treatment.

Old age is as natural an expression of endocrine sluggishness as bubbling youth and buoyant vitality are the products of well-balanced endocrine activity. *Old age is depleted endocrines.* Hardening of the arteries, failing memory, slowing up of the life processes, called old age, are now as well understood as any functions of the human body. As the endocrines run down they vary widely in the type of old age they produce. Those who have been hyper-pituitary throughout their lives show signs of nerve collapse, fretfulness, irritability and crabbedness. Those who have been hypo-thyroid throughout their lives become slow, gouty, stupid, lame. Those whose gonads failed early and who lived a long period of impotence, become depressed, surly, deaf and mentally useless.

Too much is already known, charted and tabulated along this line to admit of any doubt concerning the vast possibilities of radioactivity. What the future may bring forth is only speculative, but its intensive exploration is well worth while. If our present successes with aging human beings, with the mentally deficient, with a large number of human derelicts, unfits and defectives point the way, then great and rich continents lie immediately before us. The control of the endocrine glands to secure improvement in mental conditions, to prevent malignancies and to make over or refurbish the old and the unfit has passed the point of mere argument.

In fact, there is now ample and uncontrovertible evidence to prove that by radium water treatment the progress of senescence can be definitely retarded and scientific rejuvenation accomplished in all cases where actual structural disintegration due to disease or tumor

has not yet set in, or the organs extirpated or hopelessly injured by surgery. In all cases, excepting those so far destroyed as to be recognized by anyone as hopeless, a long new lease of normal functioning power and youthful energy is assured. The renewed energies of healthy, active manhood and womanhood are available to those whose sun of life is slowly sinking into the purple shadows of the long night. Where age, disease or other conditions have left their imprint on the glandular structures these latter can to-day be greatly re-energized through internal radioactive treatment with Radithor. In the reconstructing process of retrograde tissue metamorphosis in those of advancing age virtual rejuvenation is being effected through these newer methods.

As Field says: "Radium is without question one of the most remarkable therapeutic agents used in medical or surgical science. The discoveries, relating to its action on the tissues and fluids of the body, by pathologists and biochemists and in every-day clinical practice, have been so far-reaching that it is impossible to prophesy future development."

IN CONCLUSION

In closing this book permit me again to express my tribute to Bailey for his researches into the mysteries of the endocrine glands and for his development of Radithor for the control and activation of these glands. I think my readers will agree with me that his work assures him the leading place in the Hall of Fame of those scientists who have labored to make rejuvenation a reality.

In the Bailey Radium Laboratories at East Orange, New Jersey, where the famous Radithor is produced, this eminent scientist is still hard at work among his flasks, electroscopes, ray machines and an immense array of technical equipment ceaselessly working toward newer and greater developments. Yet he finds time to carry on a voluminous correspondence to aid the medical profession and the public in a more thorough understanding of the application of radioactive treatment to their particular problems.

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Thousands of books, articles, etc., have been written on the use of radium water and the endocrine glands by the leading authorities in this country and abroad. More definite scientific data has appeared in the past few years on these subjects, which Bailey has done so much to enhance, than on any other phase of medical treatment.

The immense array of literature that has appeared to date makes it very clear that radium water is not only already a well-established part of alert medical practice but the most important method of treatment used by foremost physicians throughout the world. The evidence as shown in the bibliography listed herewith is incontrovertible.

Out of the more than five thousand books and articles that have been published on these subjects I am listing below just a few of the better known authors for the benefit of any of my readers who may wish to acquaint himself more thoroughly with this tremendously important phase of modern scientific treatment. It is plainly evident from this list that Bailey's work with Radithor is no experiment, but is a method of treatment that has found confirmation at the hands of hundreds of scientific men the world over.

The literature mentioned below will be found, for the most part, in the medical library of any large city.

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